

# (DRAFT)

## Washington Transportation Plan Update

*Interim Briefing to the Transportation Commission*

### Transportation System Efficiency

*“optimizing the transportation system”*

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*This presentation is a public  
record document. It is a draft  
and will be revised as needed.*

*2<sup>nd</sup> Edition last revised  
8/19/2004.*

Commission Meeting  
August 19, 2004



**Washington State  
Department of Transportation**

# **This report is about getting the greatest utility from the existing transportation system – it's about operations.**

**What prevents us from getting the most from the current system?**

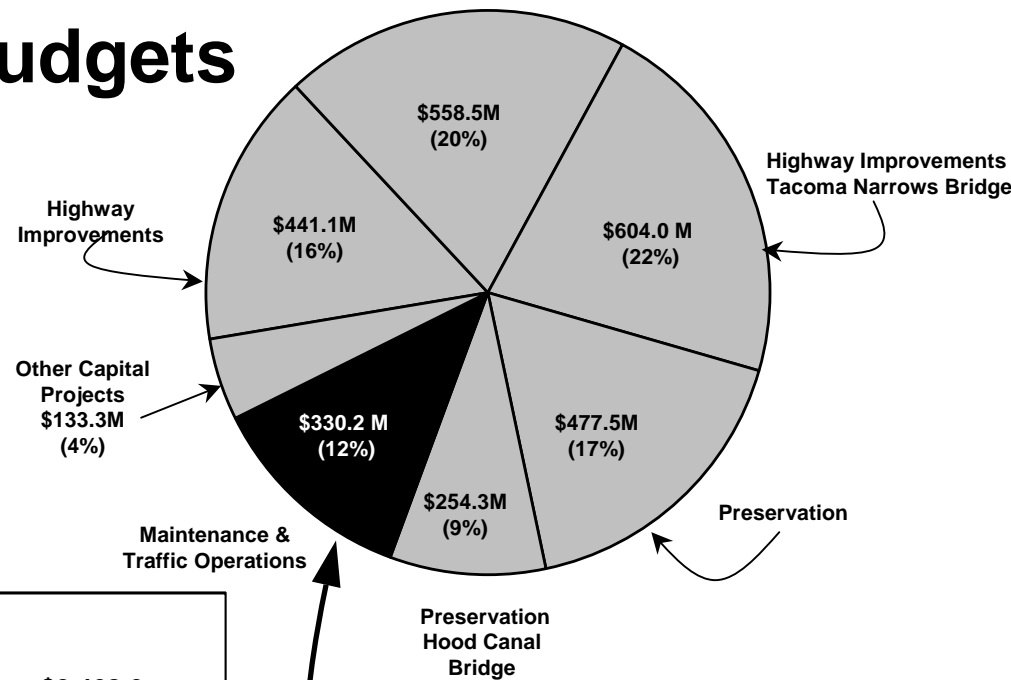
**Such things as:**

- Congestion – too much traffic or incidents
- Roadway design issues
- Traffic mix
- Weather
- System deterioration – e.g., mechanical failures
- Construction efforts – work zones
- Uncoordinated traffic signals
- Operating schedules
- Unplanned events
- Driver behavior

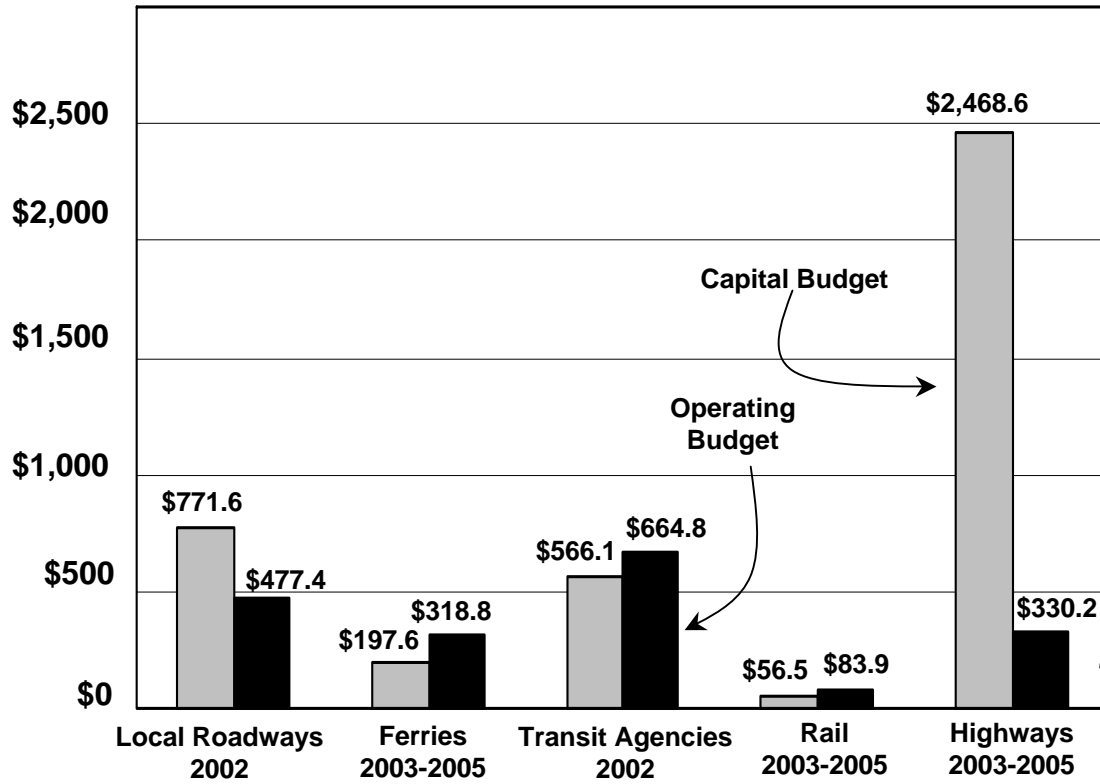
# Capital vs. Operating Budgets

- Maintenance/Operations investments are significant
- Operations expenditures account for more than half of the total budget for modes other than highways.

Highway Improvements  
2003 Funding Package

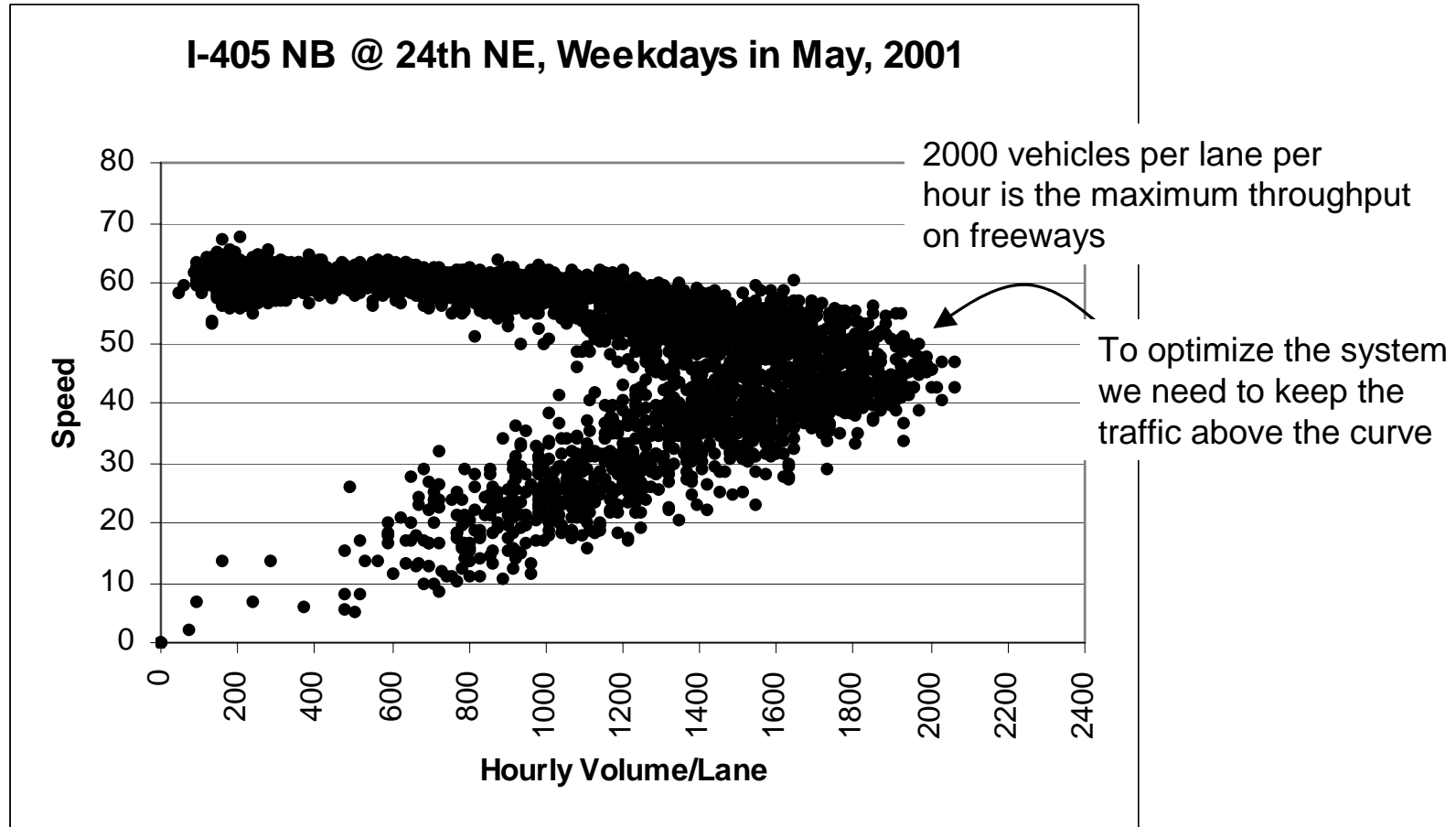


Capital vs. Operating Budgets  
(in millions)

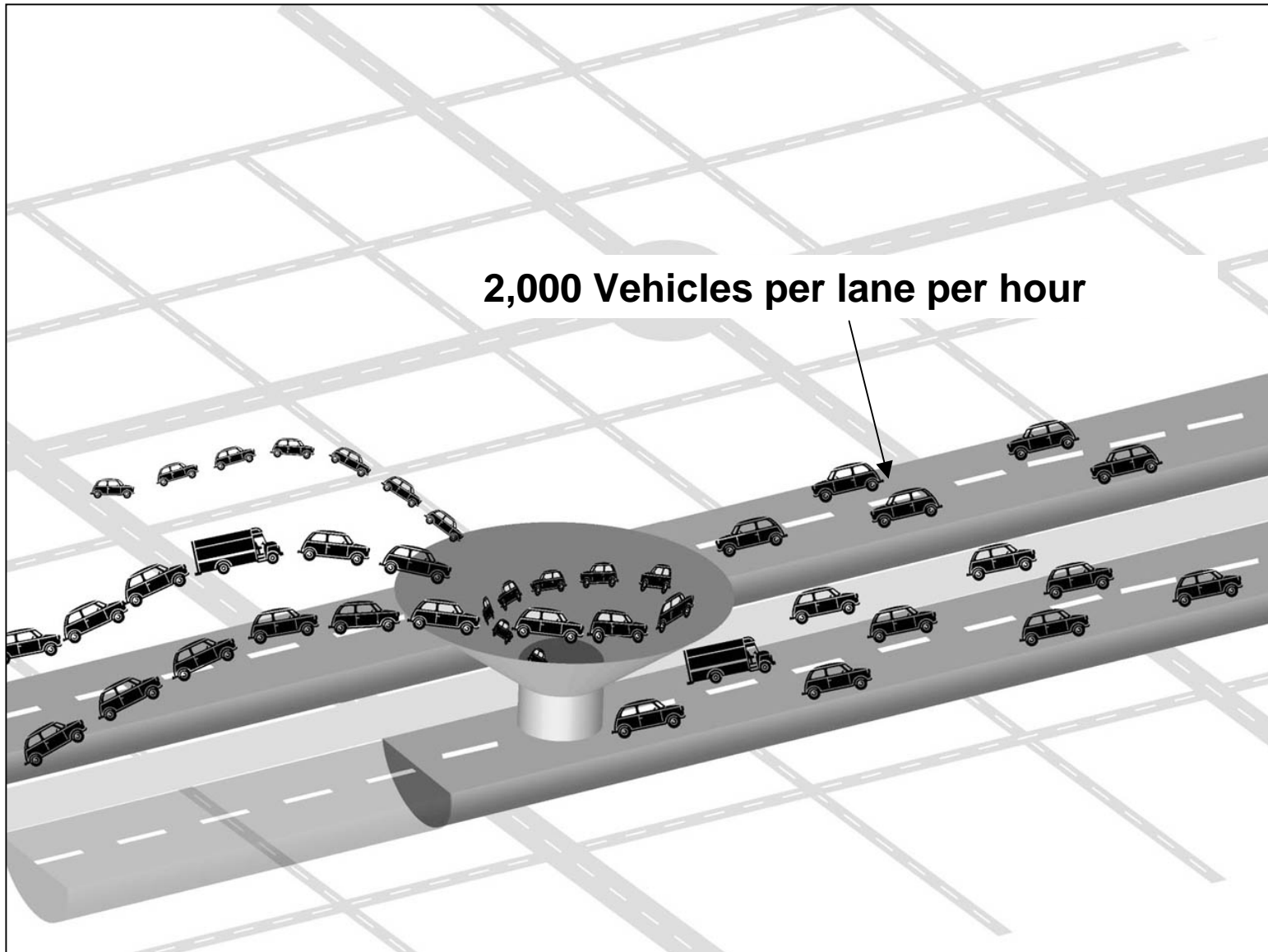


# **What's Happening on our Roadways?**

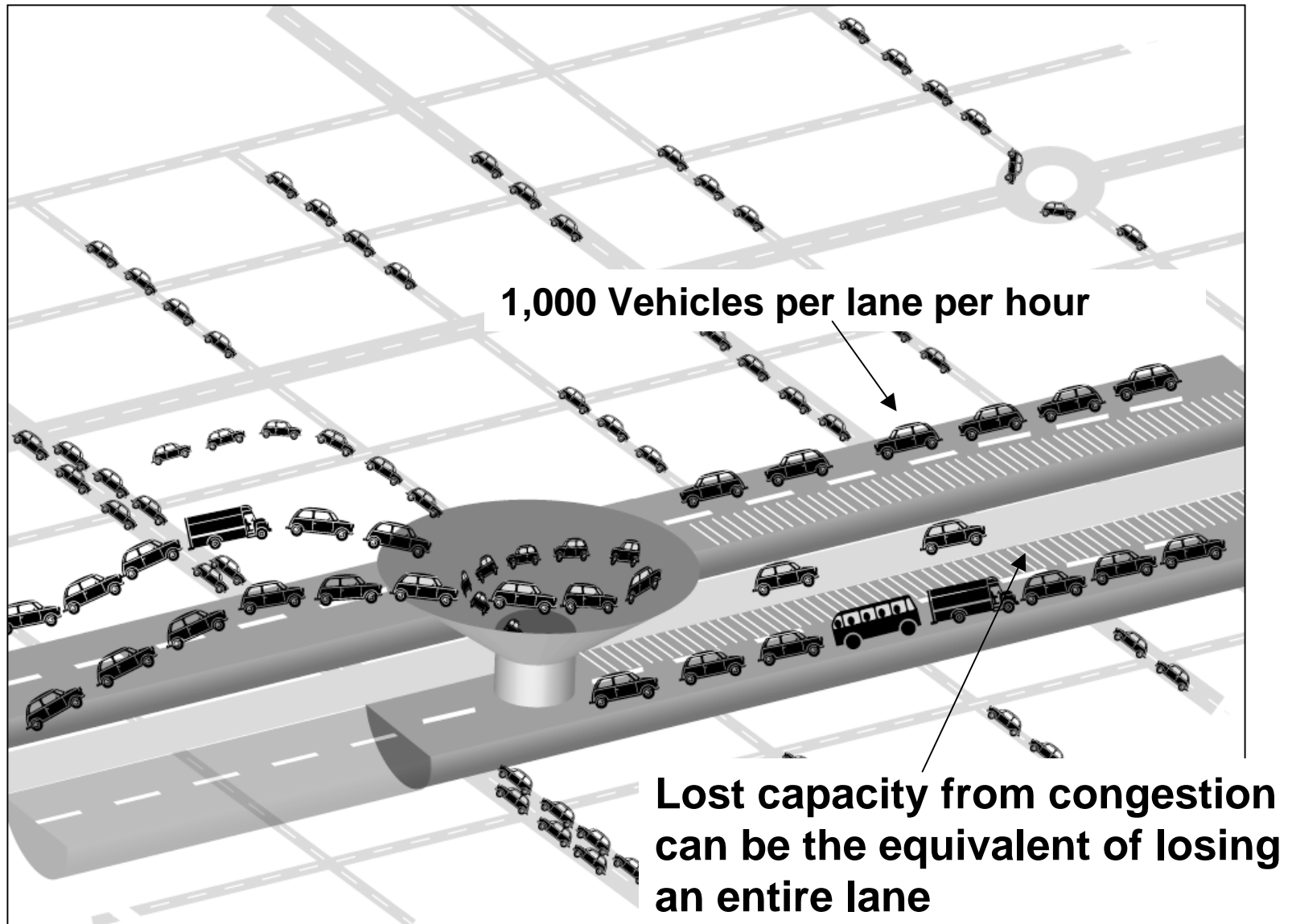
# Operating our roadways for maximum throughput is the key to getting the most out of the current system



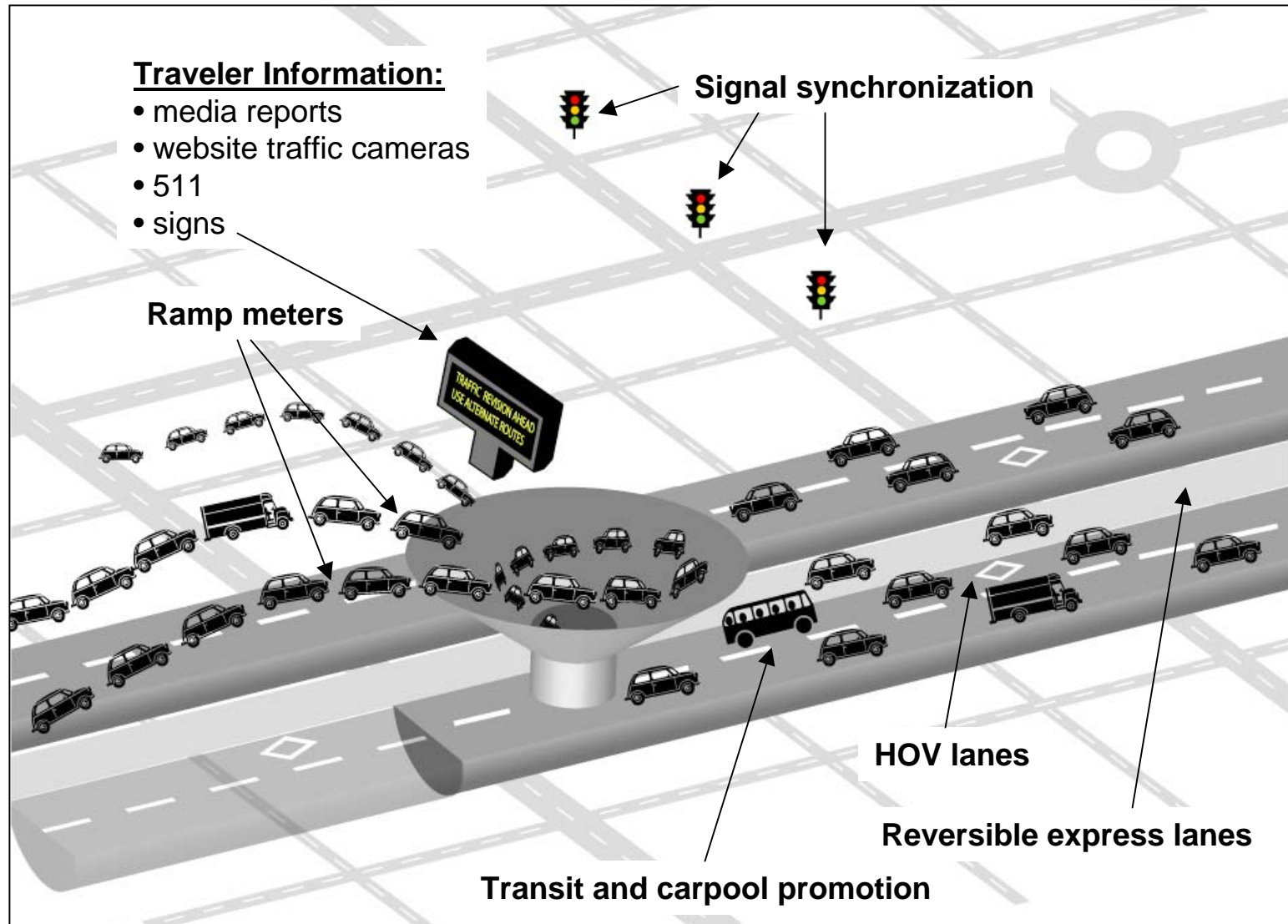
# Ideal Free-Flow Conditions



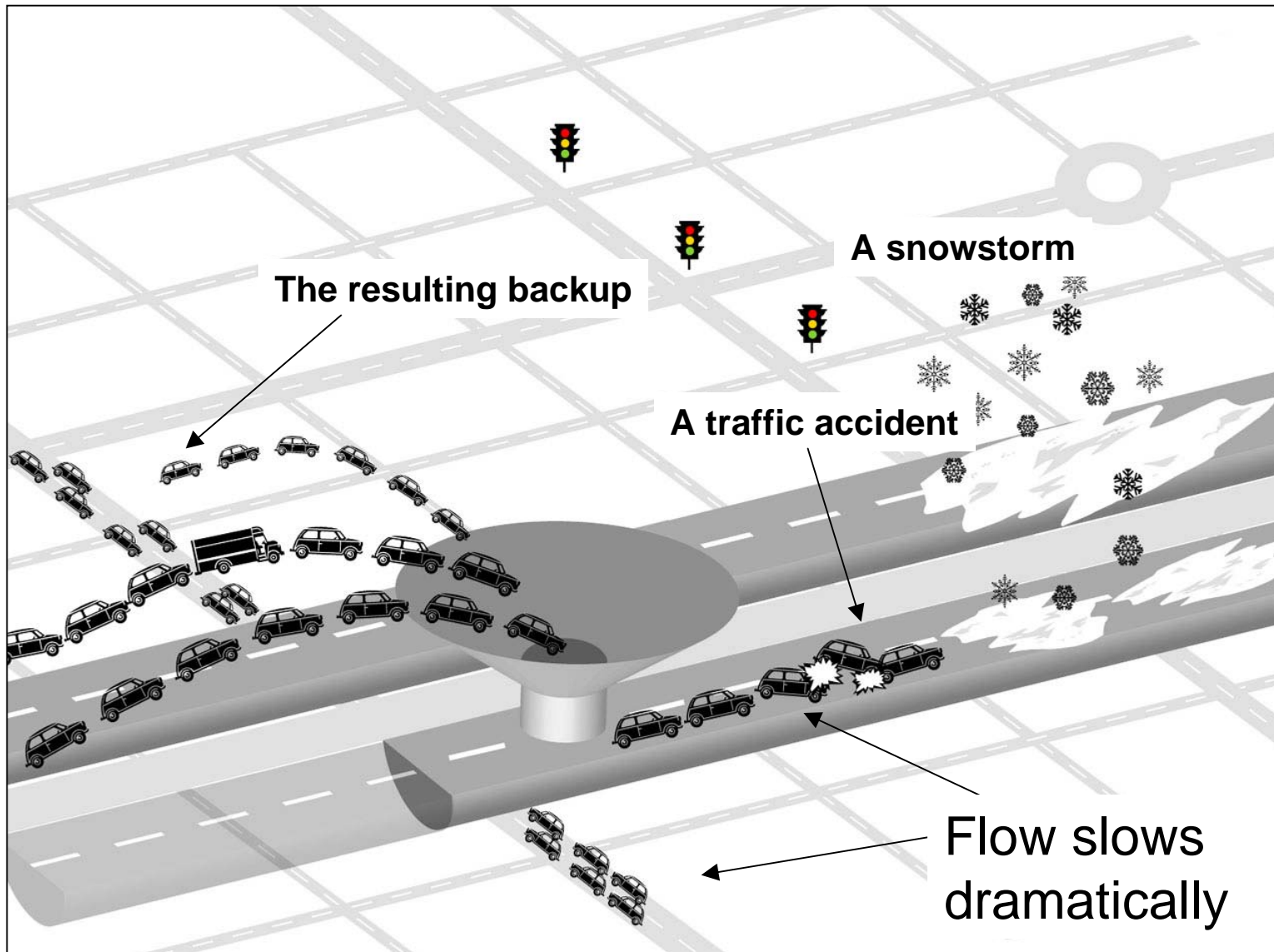
# Crowded Conditions Lead to Congestion and Loss of Capacity



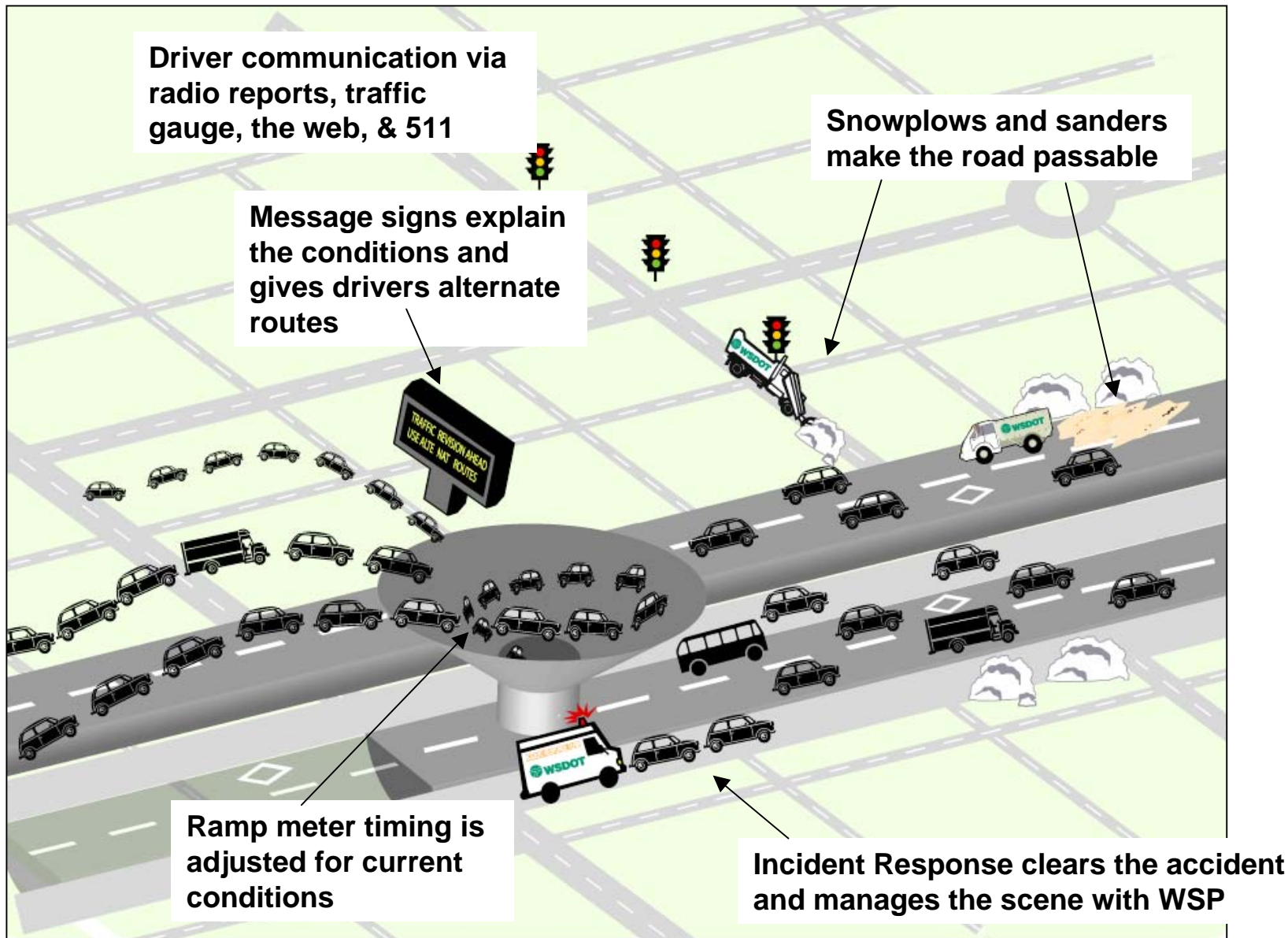
# Measures that maintain flow and manage access on a daily basis



# Unplanned Events

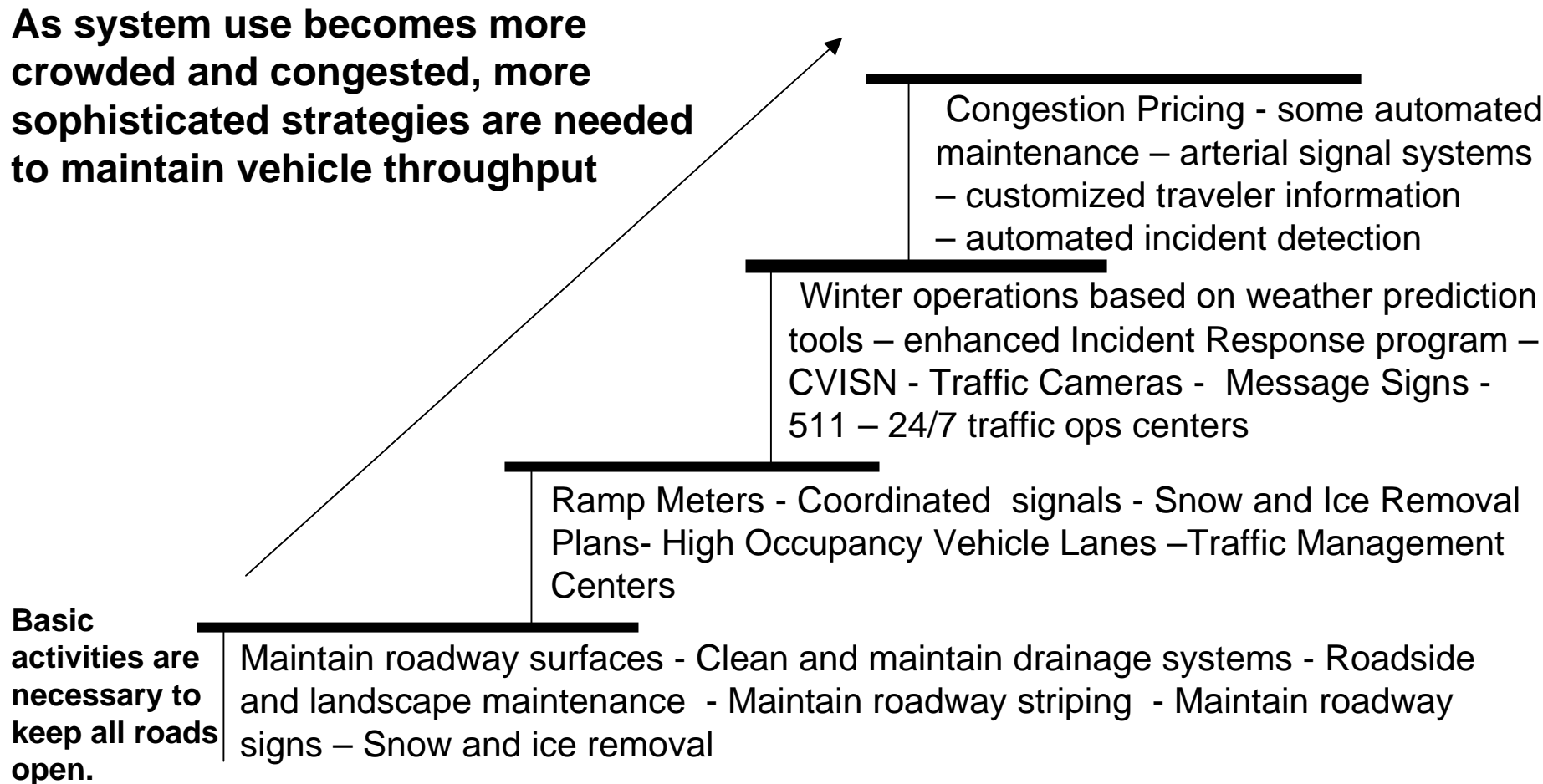


# Restoring Access and Flow



# The Continuum of System Efficiency: Maintaining Throughput

**As system use becomes more crowded and congested, more sophisticated strategies are needed to maintain vehicle throughput**



## Highway Maintenance and Operations Activities

# Basic Maintenance Matters

**We need to do all these things and more to keep the system running efficiently:**

- Paving and patching repair
- Snow and ice control
- Traffic signal systems
- Movable and floating bridge operations
- Urban tunnel systems
- Guardrail maintenance
- Noxious weed control
- Highway lighting systems operations
- Structural bridge repair
- Maintain culverts
- Regulatory sign maintenance
- Rest Area operations
- Pavement striping maintenance
- Sweeping and cleaning
- Pavement marking maintenance

# Operating the System with Intelligent Transportation Systems (ITS)

**As roadway congestion increases, ITS at Transportation Management Centers is used to maintain vehicle throughput**

We now use these types of technology:

- Ramp metering
- Incident response
- Border crossing technology
  - E-seals
  - Web info for truckers
- Commercial Vehicle Information Systems Network (CVISN)
- Traveler information
  - HAR, Web, 511, CMS,
  - 1-800
- Weather operations based on prediction tools
  - Arrows
- Coordinated signal technology

# Future of ITS

**As technology advances, this is some of the ITS we want to use in the future:**

- Automated maintenance (using machinery in place of humans in hazardous situations, i.e. remote-control avalanche control)
- Real-time fleet management (to know where the vehicle is when needed)
- Arterial signal systems tied to ramp metering
- System-wide adaptive signal system
- Traveler information delivered automatically as conditions change
- Web and 511 traveler information customized to individual needs
- Automated incident detection
- Transportation Management Centers integrated statewide

# Examples of what's working:

- Signal synchronization
- Ramp metering
- Commercial Vehicle Information Systems Network (CVISN) & Weigh-in-Motion (WIM)
- Incident Response
- Traffic flow/roadway design

# Signal Synchronization

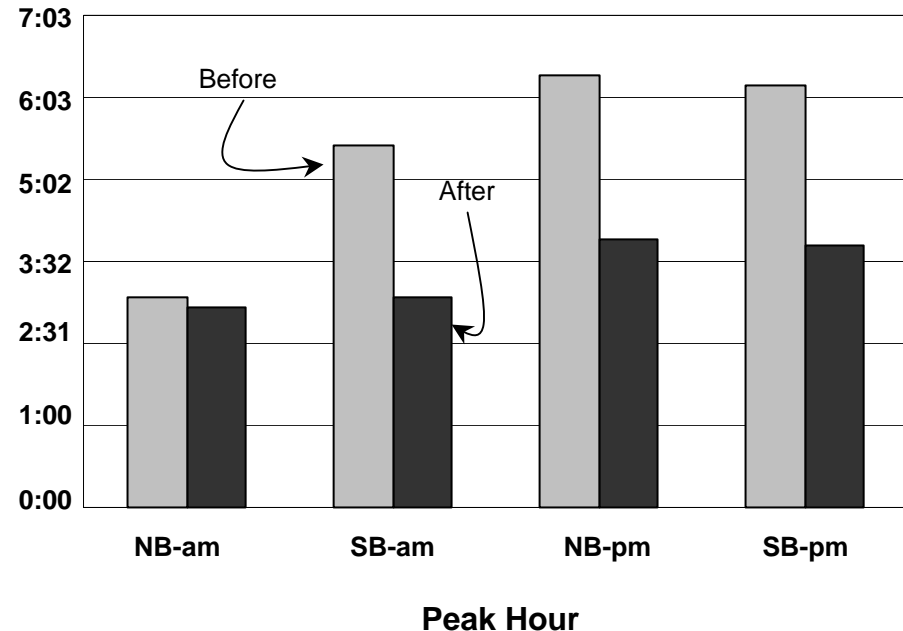
## SR 527 Signal Optimization Project

### *Before and After Study*

Average vehicle travel times were reduced ranging from 16 seconds (NB AM peak period) to 2 minutes and 27 seconds (NB PM peak period).

Stated otherwise, travel time improved 41% for the SB morning commute, and 38% for the NB evening commute.

**Before And After Travel Times  
(min:sec)**



Study conducted by the City of Bothell on retiming traffic signals on SR 527 between 228th Street SE and SR 524.

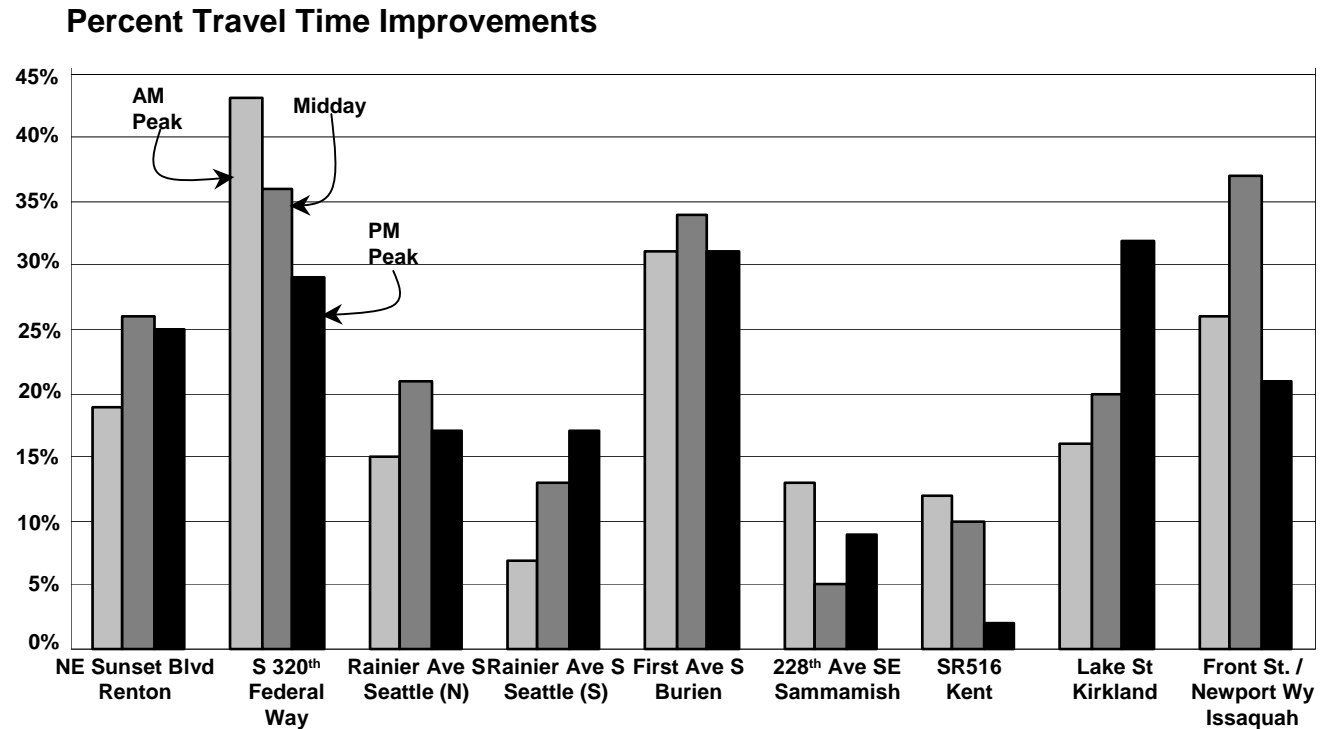
# King County Signal Synchronization

## 2002 Grant Projects

**ALL** locations experienced travel time improvement to some degree.

The greatest improvement was 43% during the AM peak at S. 320<sup>th</sup> in Federal Way.

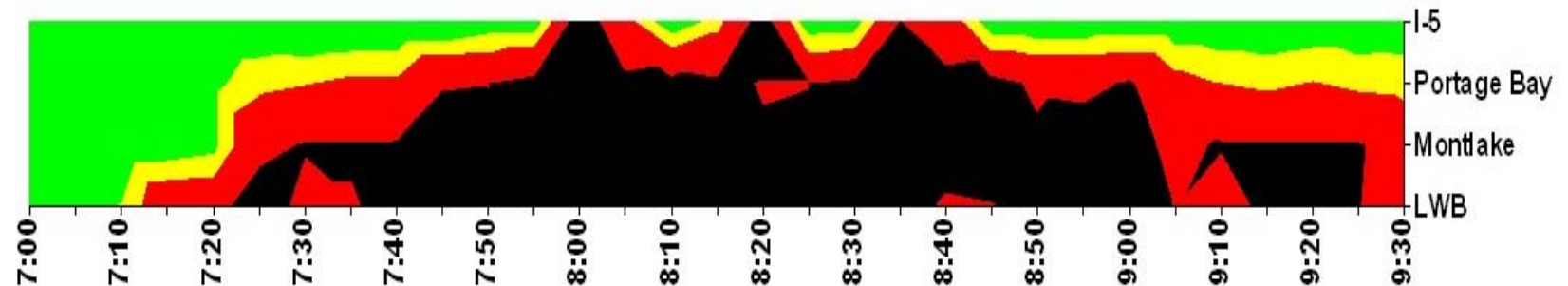
The next most improved location was midday at Front St./Newport Way in Issaquah, with 37%.



# Ramp Metering

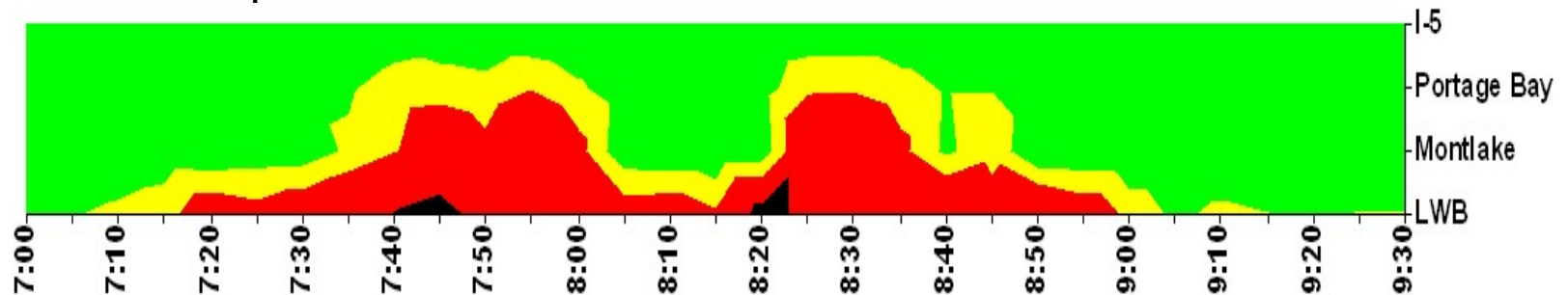
## SR 520 Westbound Ramp Meter Effects

**BEFORE** a series of ramp meters were activated: EB morning congestion, I-5 to Lake Washington Blvd:



Wednesday July 25, 2001

**AFTER** ramp meter activation:



Thursday September 6, 2001

Wide Open   ■   Moderate   ■   Heavy   ■   Stop and Go   ■

# More Ramp Metering Benefit:

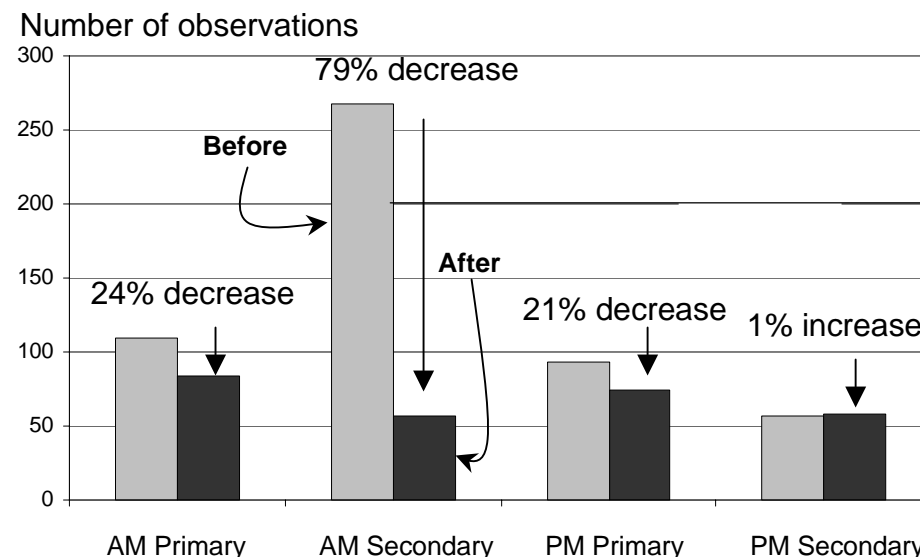
## Reduced conflict between drivers

### SR 167 at S. 212<sup>th</sup> St. Before and After Ramp Meter Activation, 2000

Before ramp meters, merging vehicles often had to brake or cause a mainline driver to brake in order to complete the merge. In a chain reaction, other mainline drivers also had to brake, contributing to overall congestion and delay.

Activating ramp meters resulted in fewer driver conflicts and smoother merges, which keeps traffic moving.

### Conflict Results at S 212<sup>th</sup> St. to NB SR 167



**Primary conflicts:** when either the merging vehicle or the adjacent mainline vehicle brake to avoid each other.

**Secondary conflicts:** mainline drivers behind a primary conflict that also must brake

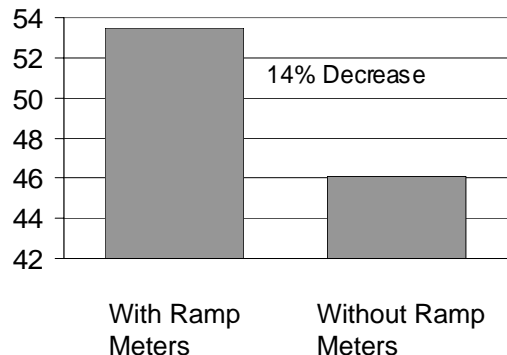
# Ramp Meters:

## Minnesota Twin Cities case study

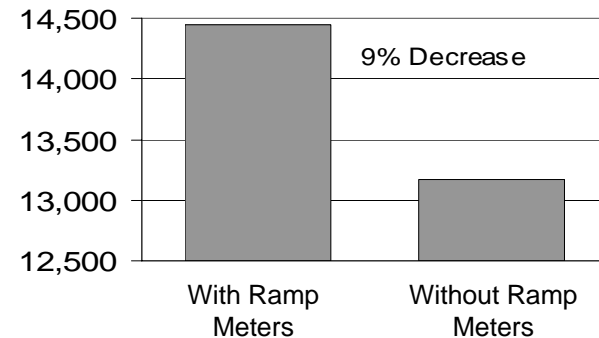
### A 2000 shutdown study showed that:

- Without ramp meters, freeway average speeds decreased 14%.
- Average travel time increased 22% and became twice as unpredictable.
- Freeway volumes decreased by 9% - fewer vehicles were accommodated.
- Peak period accidents increased 26%.

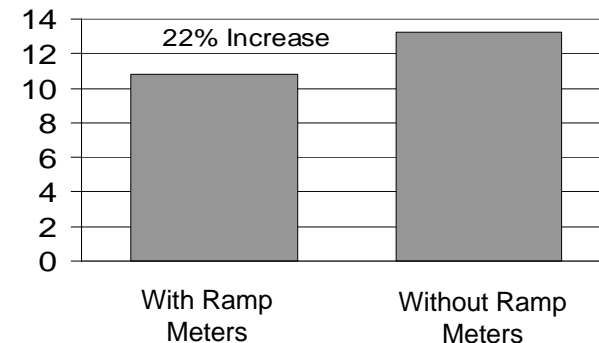
Twin Cities Freeway Speed  
Average (mph)



Twin Cities Freeway Volume  
Average (Number of Vehicles)



Twin Cities Freeway Travel  
Time Average (minutes)



# CVISN / Weigh-in-Motion

## Time and Money Savings

According to the American Trucking Association, the cost for an idling truck is \$1 per minute. In some states, it can take up to 45 minutes for a truck to pass through a weigh station.

The table below shows the savings in time and dollars achieved by the use of CVISN transponders and WIM in Washington.

### Benefits of CVISN and WIM

*July 1, 2002 to June 30, 2003*

	<i>Bypass Events</i>	<i>Dollar Savings*</i>	<i>Time Savings</i>
CVISN and WIM	506,801	\$3,106,690	51,778 hours
WIM only	1,544,068	\$9,465,137	157,752 hours
<b>Total</b>	<b>2,050,869</b>	<b>\$12,571,827</b>	<b>209,530 hours</b>

*\*Savings calculated based on 6.13 minutes saved per bypass event and a \$1 per minute cost of idling trucks.*

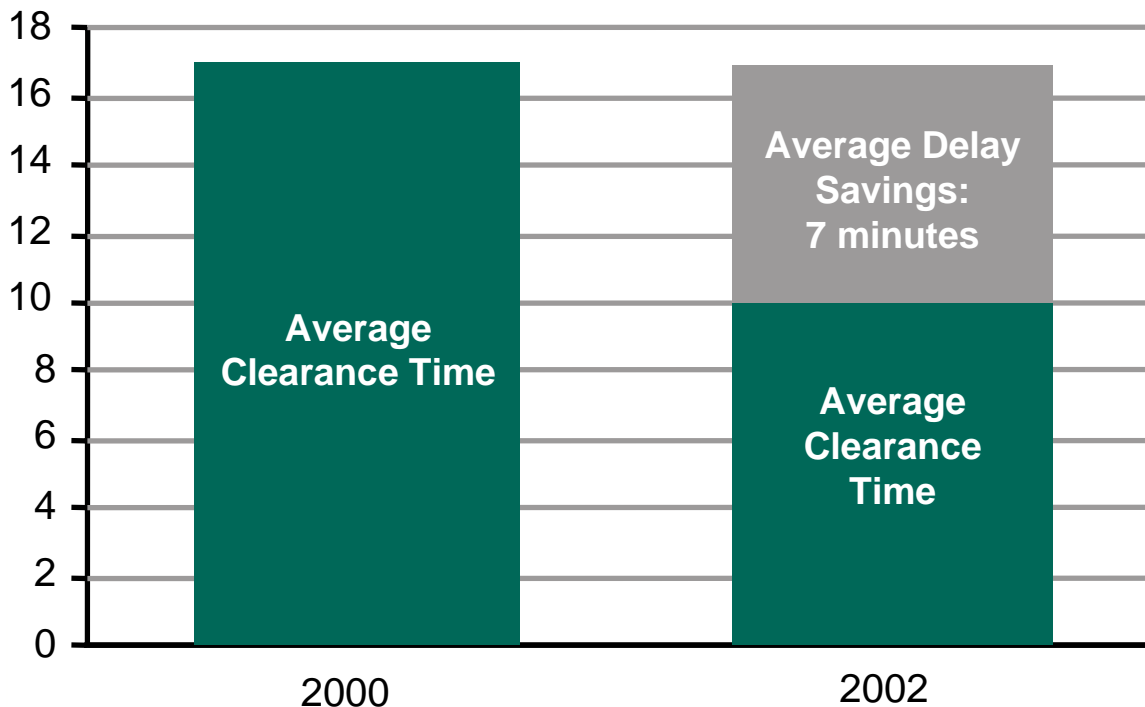
# Incident Response:

## I-405 Before and After IRT

In 2000, it took the WSP an average of 17 minutes to clear a disabled vehicle. By 2002, an average 7-minute reduction in delay was measured after IRT units began roving the I-405 corridor.

### I-405 Disabled Vehicles

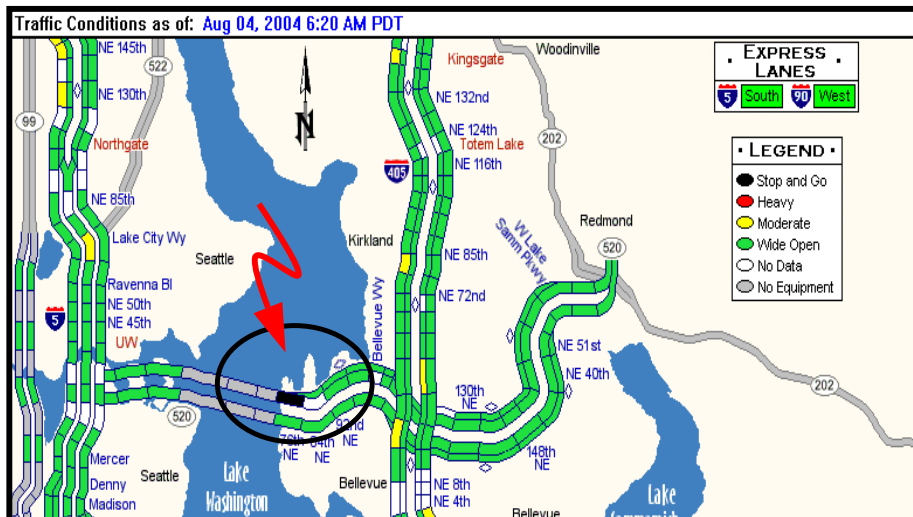
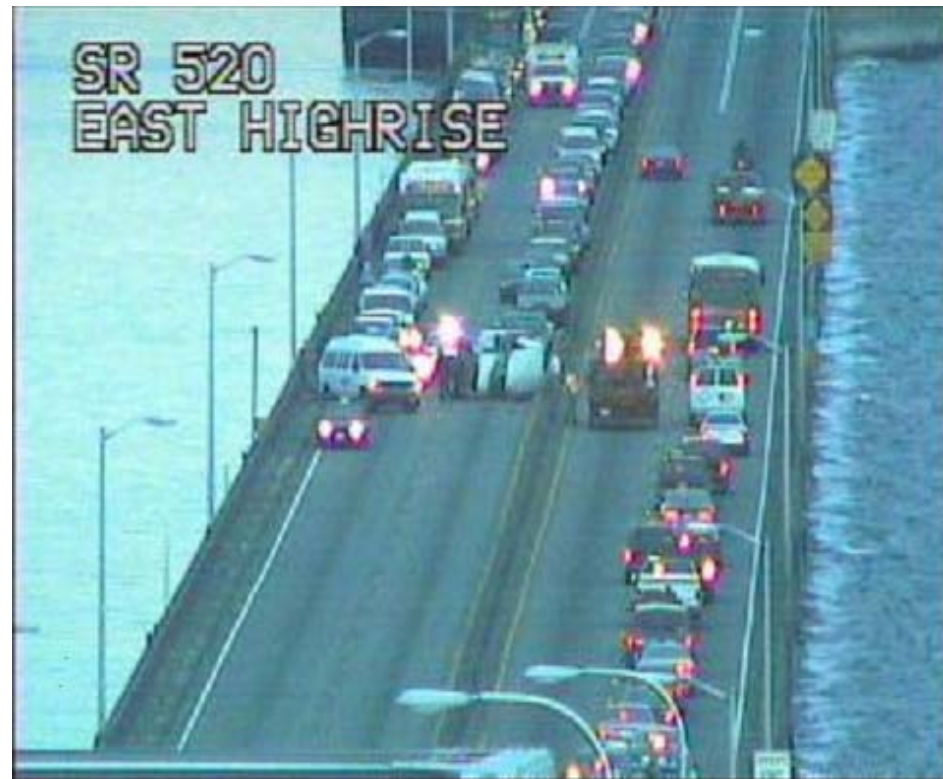
Average Delay Savings with Incident Response in Minutes



# More Incident Response: An example of what road efficiency looks like when it all works!

## *Incident Response, Traffic Information Systems, Public Affairs and drivers working together*

At about 6 a.m., Wednesday, August 4, there was a rollover collision mid-span on the eastbound SR 520 Floating Bridge that closed both eastbound lanes. By 6:25, the eastbound back up extended to Lake Washington Blvd. and the westbound back up extended to 76<sup>th</sup> Ave.



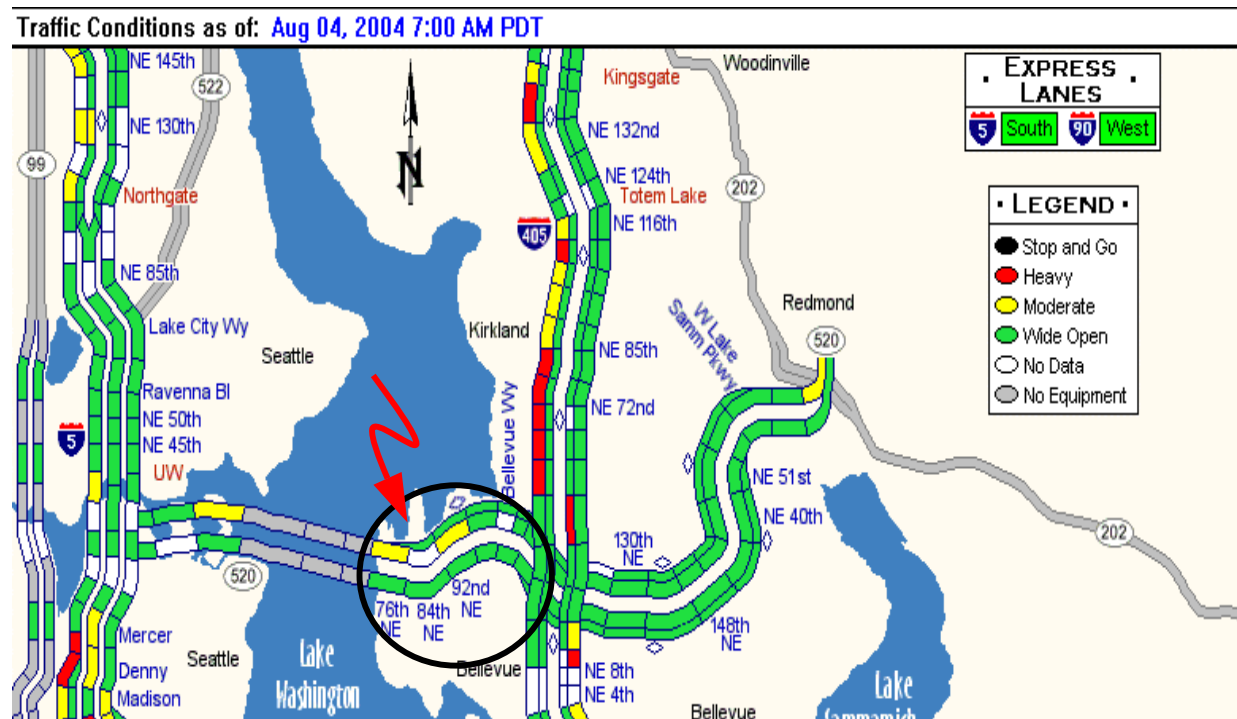
© WSDOT

Aug 04, 2004 6:14AM PDT

23

# Why the system didn't collapse when the bridge was suddenly closed

- At about 6 a.m., traffic flow engineers illuminated the message signs alerting drivers to the collision and recommending other routes.
- At the same time, traffic flow engineers recorded messages to highway advisory radios and the DOT-HWY and 1-800-695-ROAD telephone service.
- Public affairs sent out an incident release and put the information on the 511 System.
- Incident Response was immediately on the scene and cleaned up the collision within 40 minutes.
- Backup was at a minimum because drivers got the message and took alternate routes - they did the right things because they knew what to do – we let the public know.



# Traffic Flow/Roadway Design

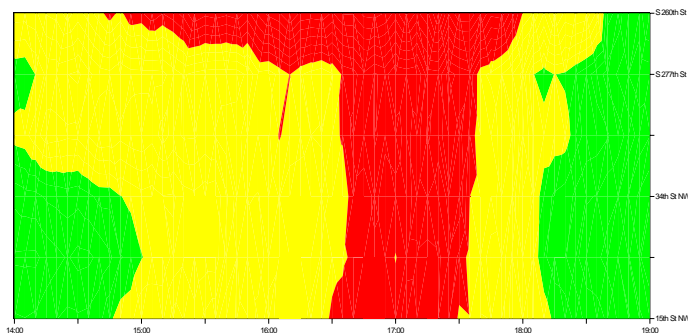
## SR 167 Restripe Project

### SR-167 Southbound at 15<sup>th</sup> St. NW

**Project Construction Cost: \$42,000**

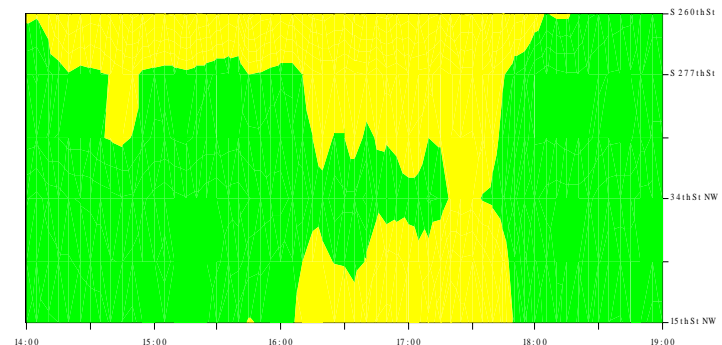
Drivers used to experience significant daily congestion at this location, especially during the mid-afternoon commute. In response to a commuter's suggestion, a third through-lane was added by restriping the existing pavement. As a result, congestion approaching the interchange has been significantly reduced.

**SR 167 Southbound Congestion  
(Oct, Nov, & Dec, 2001)**



**Green** - 0-15% Wide open  
**Yellow** - 5-22% Moderate  
**Red** - 22-35% Heavy

**SR 167 Southbound Congestion  
(Oct, Nov, & Dec, 2003)**



# CONCLUSIONS

- **System operations is about aligning transportation system performance with customer expectations, and getting the highest performance possible out of the existing system – this applies to all modes.**
- **On roadways, including transit, throughput is a key measure of system efficiency**
  - Basic maintenance and operations are essential to keep the system open and operating.
  - As traffic grows, increasingly sophisticated management techniques are needed to maintain flow.
- **Information technology will allow the next generation of management techniques.**
  - Advanced communication will permit real-time information for travelers.
  - In-vehicle ITS devices (such as On-Star) will be the next step, sharing weather, safety and transportation system data with drivers, system providers and first responders.
  - Enabling closer integration of modes (highway and transit) to address real-time system coordination needs.
- **The focus has been on system efficiency measures – the next frontier is on point-specific applications to improve flow at specific chokepoints (such as truck performance on specific on-ramps).**
- **System pricing is emerging as one of the primary options to effectively maintain flow, because price allows the ultimate flexibility in matching roadway capacity to traffic demands.**
- **Operational approaches should be viewed as part of a continuum and an integral part of our investment program: a commitment to maintain and operate the system; management techniques to maximize use of the system; and capital investment to expand the system where needed.**

# **What's Happening in Public Transportation?**

# Existing Bus Operations

## 2002 Statewide Fixed Route Statistics

- 93.9 million total vehicle miles
- 6.26 million total vehicle hours
- 148.8 million passenger trips

## Infrastructure/Facilities

- 205 High Occupancy Vehicle lane miles since 1973
- 294 park and ride lots

## Public Transportation

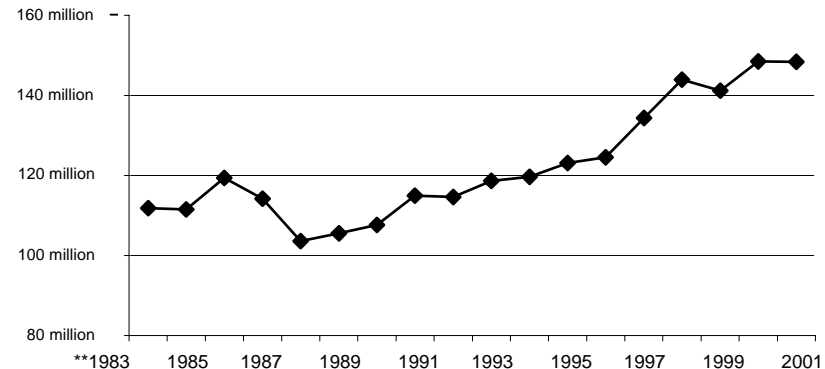
- Over 2,700 transit buses operating statewide
- 1,600 vans supporting vanpools across the state

## Other Transportation Programs

- Transportation Demand Management
- Demand Response

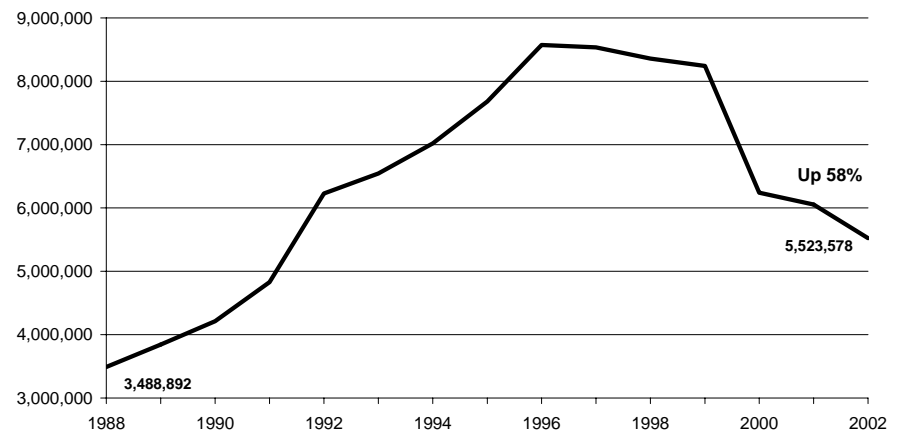
***Buses, vanpools and carpools are High Occupancy Vehicles***

Annual Unlinked Passenger Trips



Volumes noted are Annual Unlinked Passenger Trips. All data is from the National Transit Database (NTD). King County Metro includes: MB (Motor Bus) and TB (Trolley Bus) SC (Street Car) unlinked trips. All others are MB (Motor Bus) unlinked trips. \*no data reported to the NTD for this year \*\*In the 1980 US Census, some suburban population areas were reclassified as urban areas. As a result, the transit systems serving these areas were then required to begin submitting yearly operating data to the National Transit Database - many of these beginning reporting in 1983.

Rural Transit 1988 to 2000 Ridership Growth  
Total Unlinked Trips



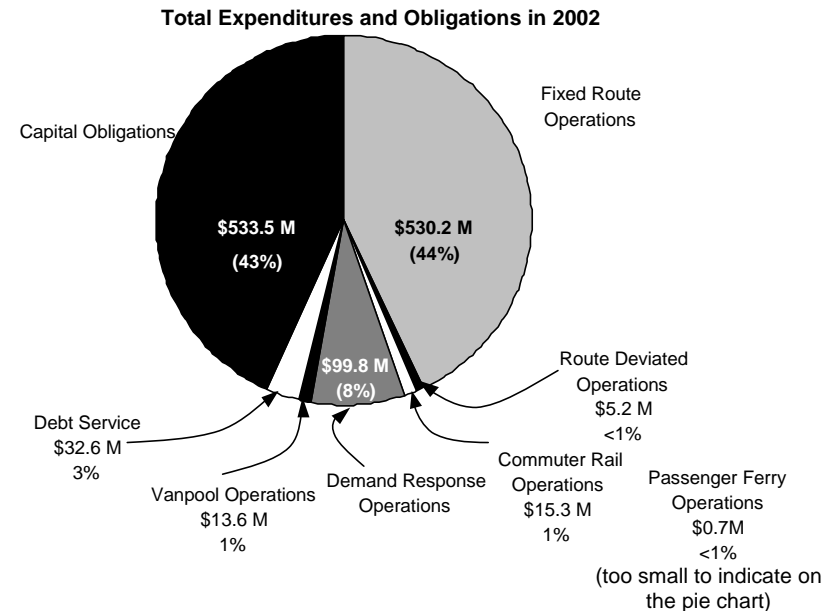
Source: WSDOT Annual Statistical Summary of Public Transportation (1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, & 2001)

# Transit Operations in Washington

- There are 26 transit systems currently operating in Washington State--19 of which are public transportation benefit areas.
- The majority of transit agencies provide fixed route and demand response service (including *complementary paratransit*, Americans with Disabilities Act service), vanpool and rideshare services and programs, and park and ride facilities.
- Transit reduces the number of SOV while maintaining or increasing the people-carrying capacity on a roadway.

## Transit System Operating Efficiencies

- Service designs for community needs through periodic evaluations and adjustments
- Frequencies of service and resource allocation
- Maximizing capacities by increasing trips per hour and coordinating demand responsive trips.



## How would you detect inefficiencies?

- Reduction in running time or delays
- Reduction in ridership
- Higher cost per unit expended

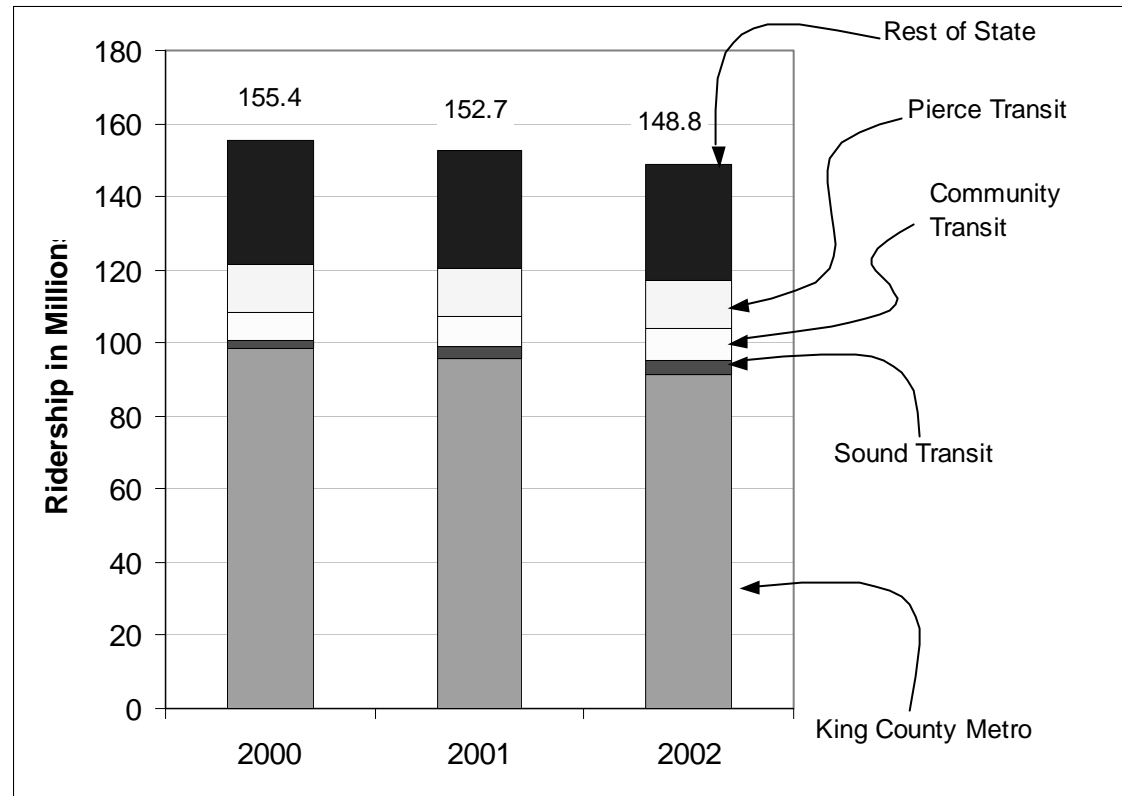
# Puget Sound Transit Operations

Transit operations in the King, Snohomish and Pierce County account for 79% of the statewide total in 2002.

The largest provider is King County Metro (2003).

- **91,591,399** passenger boardings
- **3,395,677** total vehicle hours
- **1,300** buses
- **856** vans in operation
- **1,793,814** vanpool ridership
- **1,076,755** Paratransit ridership
- **100** permanent and leased park and ride lots with **17,000** parking spaces

Statewide Transit Ridership



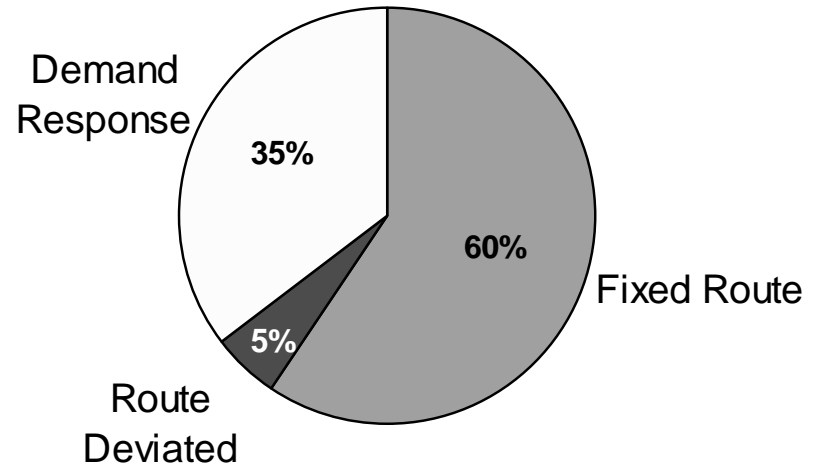
# Link Transit

Since 1991, Link Transit has been providing public transportation throughout Chelan and Douglas Counties. Based in Wenatchee, they provide fixed route, ADA paratransit service, and route deviated service to 13 communities in Chelan and western Douglas Counties.

Link Transit's Philosophy and motto is "Catch the Spirit!", The spirit of mobility." Link Transit's commitment to service is based on ***safety, courtesy, efficiency, and image.***

Link Transit serves the 93,000 residents living within the Chelan Douglas Transportation Benefit Area, along with *new friends* and *guests* that visit our area every year.

Total Vehicle Hours in 2002



## How many people ride Link?

Currently, Link carries about 2,700 people per day and in 2001, they carried 628,756 people. Since December 1991, over 13 million people have used Link Transit. In addition, Link maintain 3 park and ride lots.

# **Improving Transit Operations**

- **Operating Configuration**
- **Improving Communication**
- **HOV Lane Strategies**
- **Park and Ride Lots**
- **TDM Strategies including CTR**
- **Land Use Strategies**

# Operating Configurations

## **Transfer Based System Design**

Pulse scheduling where all vehicles come together at a common location to allow passenger transfers. Higher frequency services allow for more flexibility with transfers and relies less on common arrival and departure times.

## **Direct Point-to-Point System Design**

Radial Systems

Commuter bus service at specific locations for express services with limited stops.

## **Demand Responsive**

Trips requested from individuals either in advance or real time.

Curb to curb, door to door service that is often separate transit service function and dispatching.

## **Route Deviated Services**

Fixed route services that may go off route to provide curb to curb services for people with disabilities. Often used in lower density areas.

# Improving Operations Through Communications

- ITS Automated Vehicle Locator
- 511 Traveler Information
- Transit Transponder use
- Interagency coordination of transit service
- Transit Signal Prioritization
- Queue jumps for transit buses
- Coordinated dispatch/radio equipment
- Trip Planner – online transit trip planning system
- Smart Cards

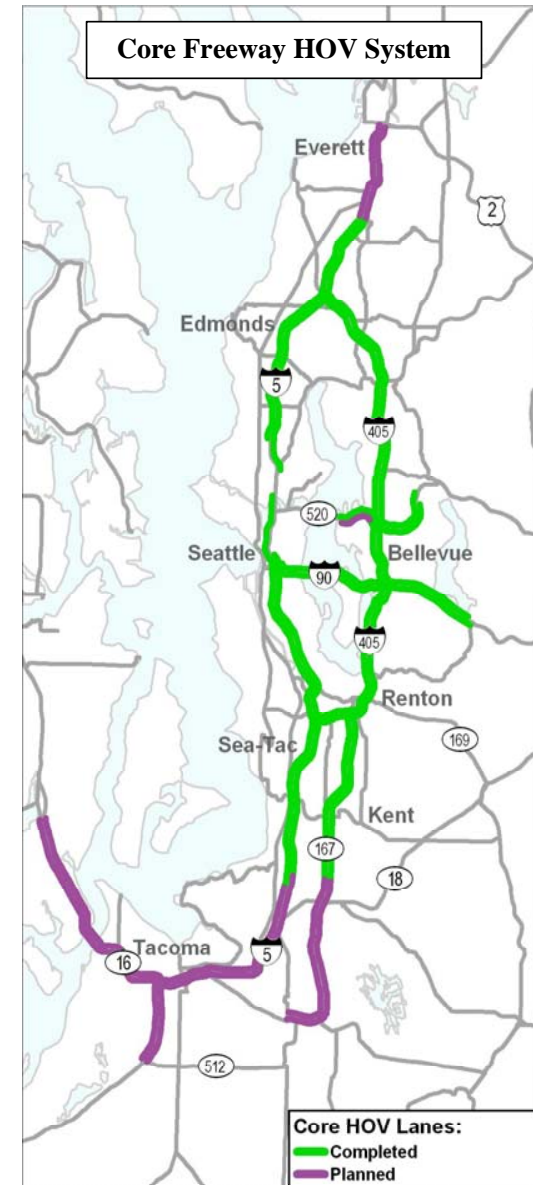
# High Occupancy Vehicles: Improving System Efficiencies

## High Occupancy Vehicle Lanes

- Improve the capability of congested freeway corridors to move more people by increasing the number of people per vehicle
- High Occupancy Vehicles are defined as buses, vanpools, carpools (motorcycles are also allowed)
- Most of the HOV system is 2+
- 200,000+ people use HOV lanes daily in the Puget Sound Region

## Park and Ride Lots

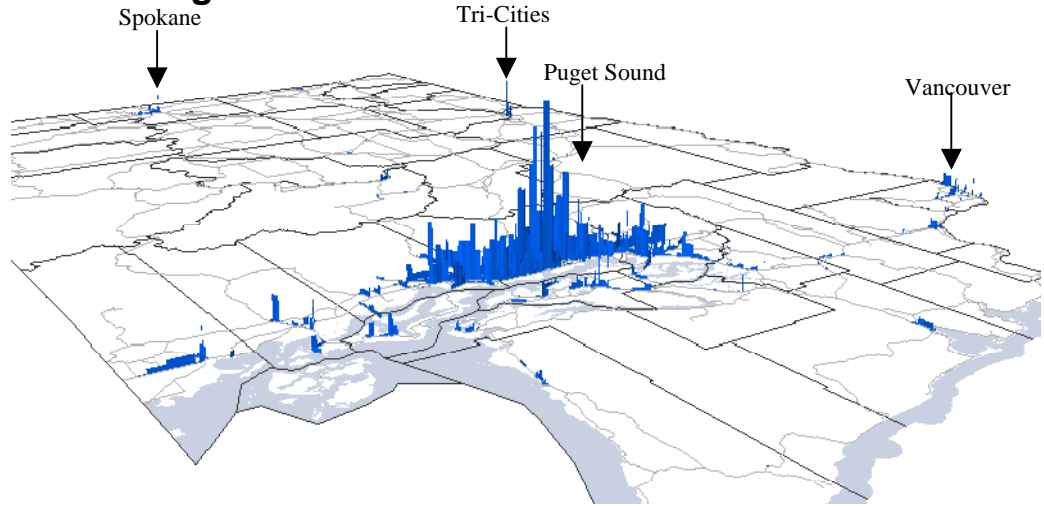
- Enable transfer from single occupancy vehicles to HOVs
- 20,000 commuters use park and ride lots in Puget Sound; 35,000 statewide



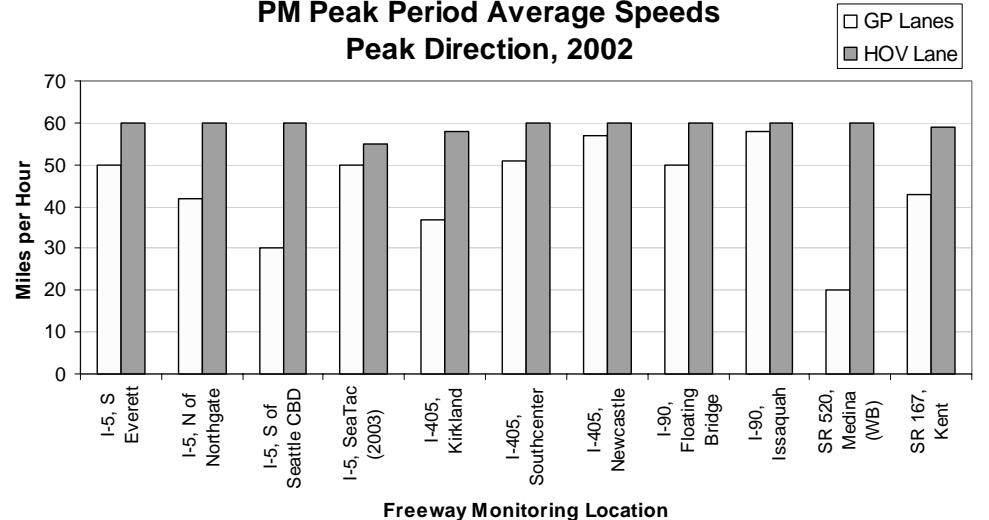
# HOV Lanes Provide Travel Time Savings

- General Purpose (GP) lanes are often congested
- HOV lanes offer travel time savings through the state's most congested corridors.
- The 2002 average speeds for PM peak period peak direction in the Puget Sound Region at the Freeway locations to the right was:
  - HOV: 59 mph
  - GP: 44 mph

**Distribution of Total Vehicle Hours of Delay Per Lane Mile in Washington State**



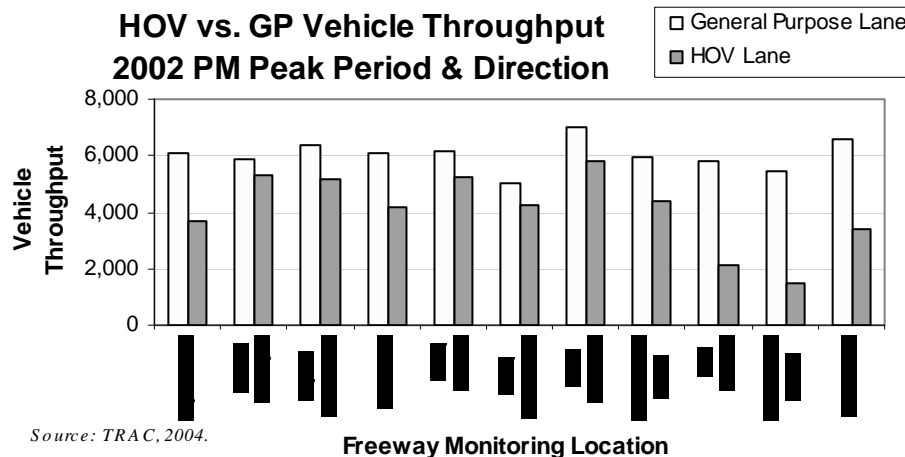
**PM Peak Period Average Speeds  
Peak Direction, 2002**



# HOV Lanes Move More People

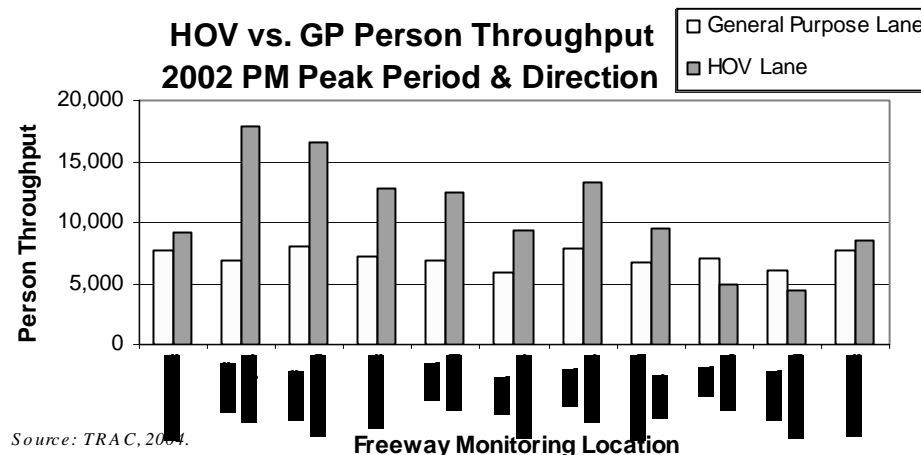
## *GP lanes move more vehicles than HOV lanes*

- Vehicle throughput during the PM peak period in the peak direction :
  - Approx. 45,000 vehicles in the Puget Sound Region.
  - Throughput in GP lanes was generally higher than in adjacent HOV lanes.



## *But, HOV lanes are more efficient as they move more people*

- Person throughput per lane PM peak period peak direction:
  - Approx. 120,000 people in the Puget Sound Region.
  - Throughput in HOV lanes was higher than in adjacent GP lanes in all but two locations.



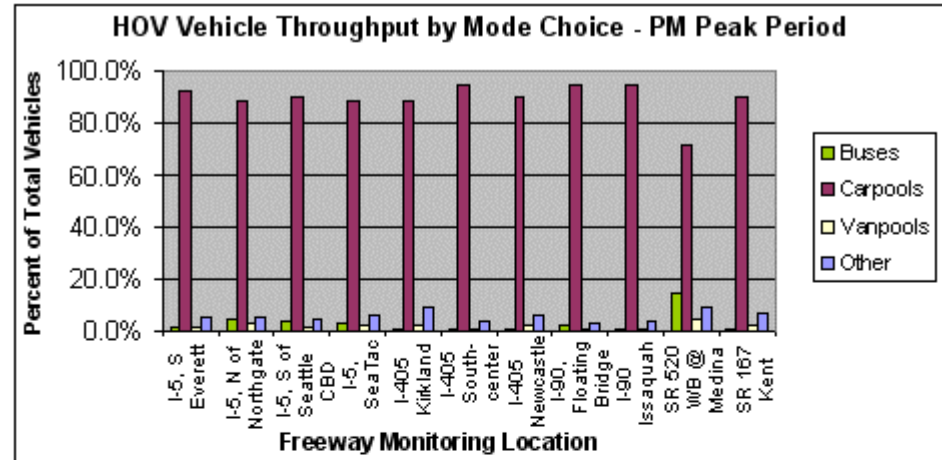
***HOV lanes throughput 33% of the people in only 18% of the vehicles during the PM directional peak.***

# Travel Conservation: Employing Today's Efficiency Tools

- What types of vehicles are using the HOV lanes during the PM peak period?

- Buses:	3%
- Carpools:	89%
- Vanpools:	2%
- Other:	6%

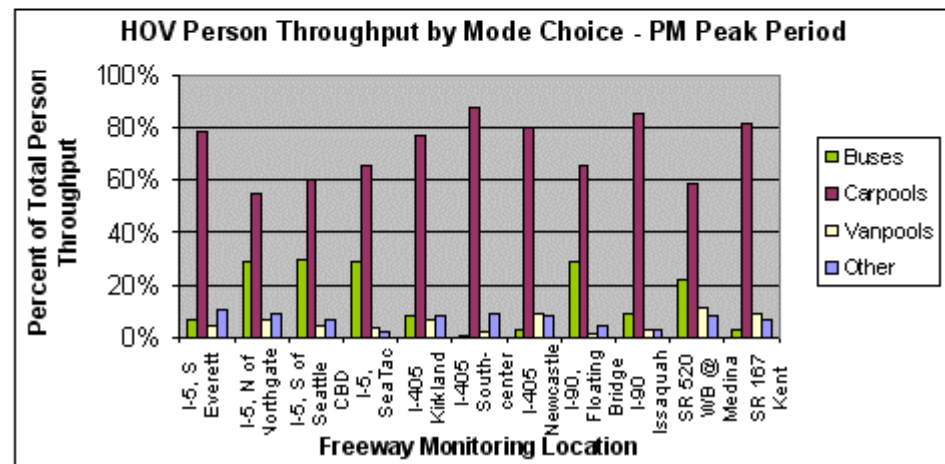
*Non-weighted averages, TRAC 2002 volumes.*



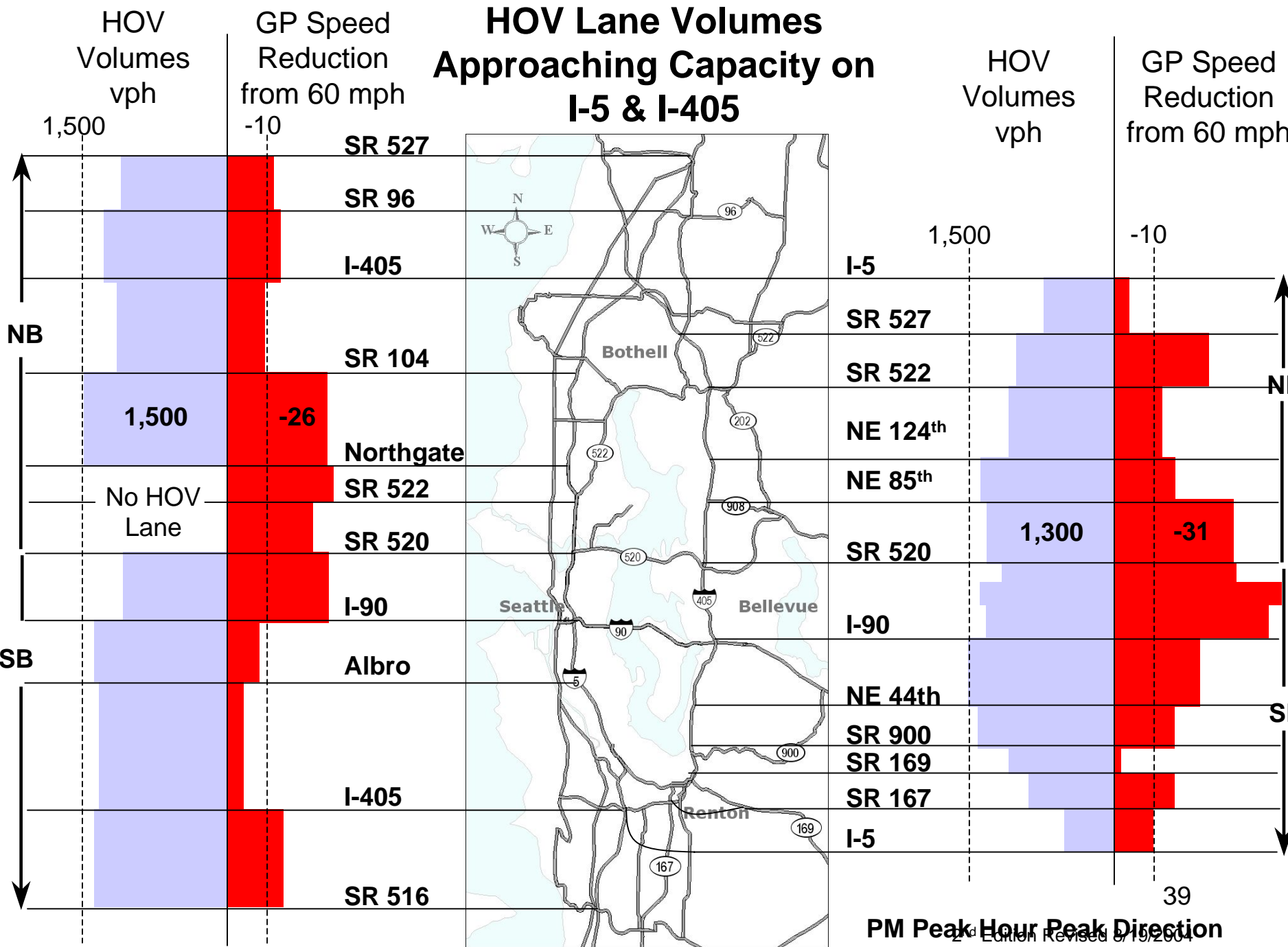
- What mode are people in the HOV lanes using during the PM peak period?

- Buses:	15%
(76% Buses on SR 520 during AM peak)	
- Carpools:	72%
- Vanpools:	6%
- Other:	7%

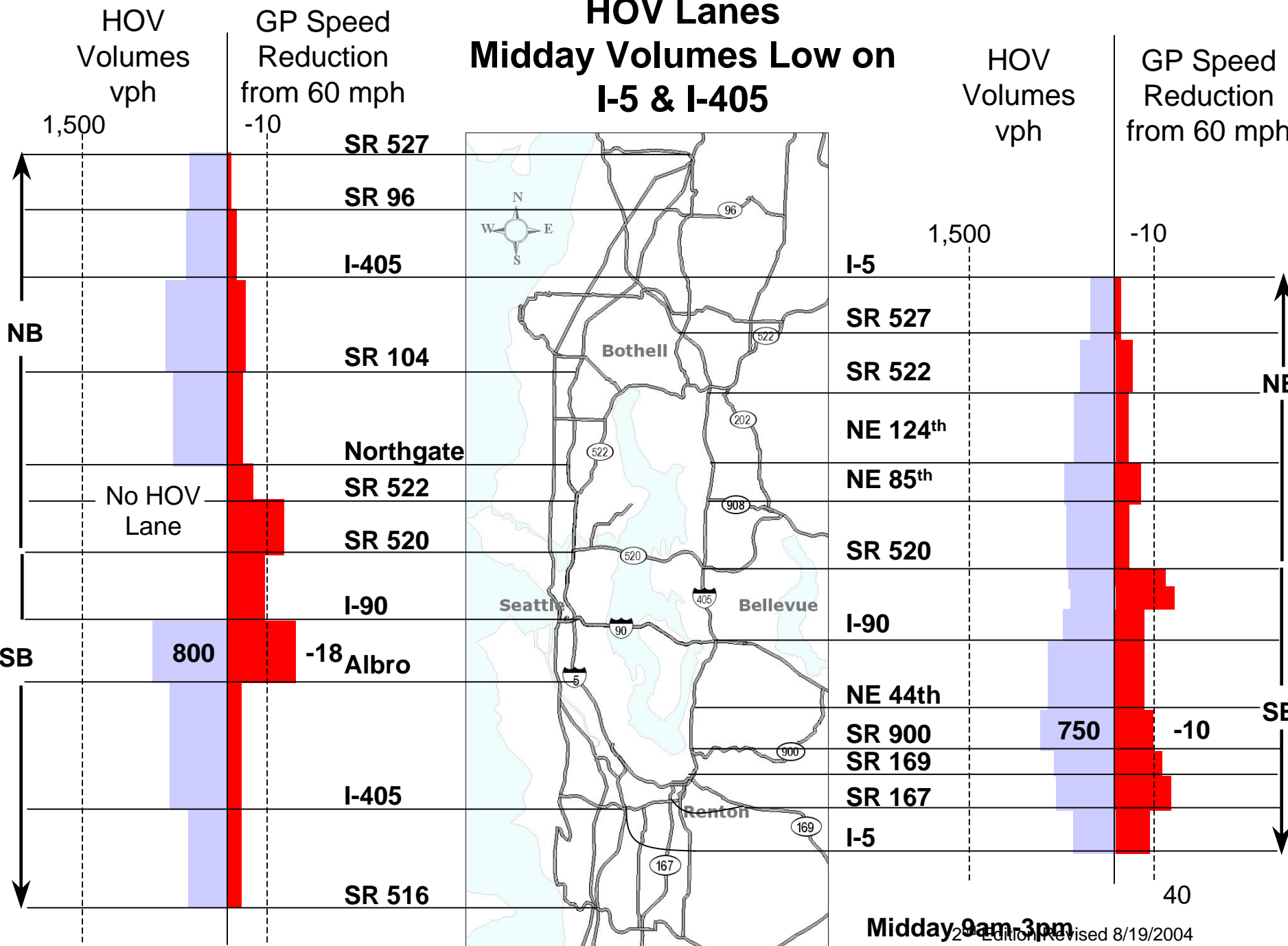
*Non-weighted averages, TRAC 2002 volumes.*



# HOV Lane Volumes Approaching Capacity on I-5 & I-405



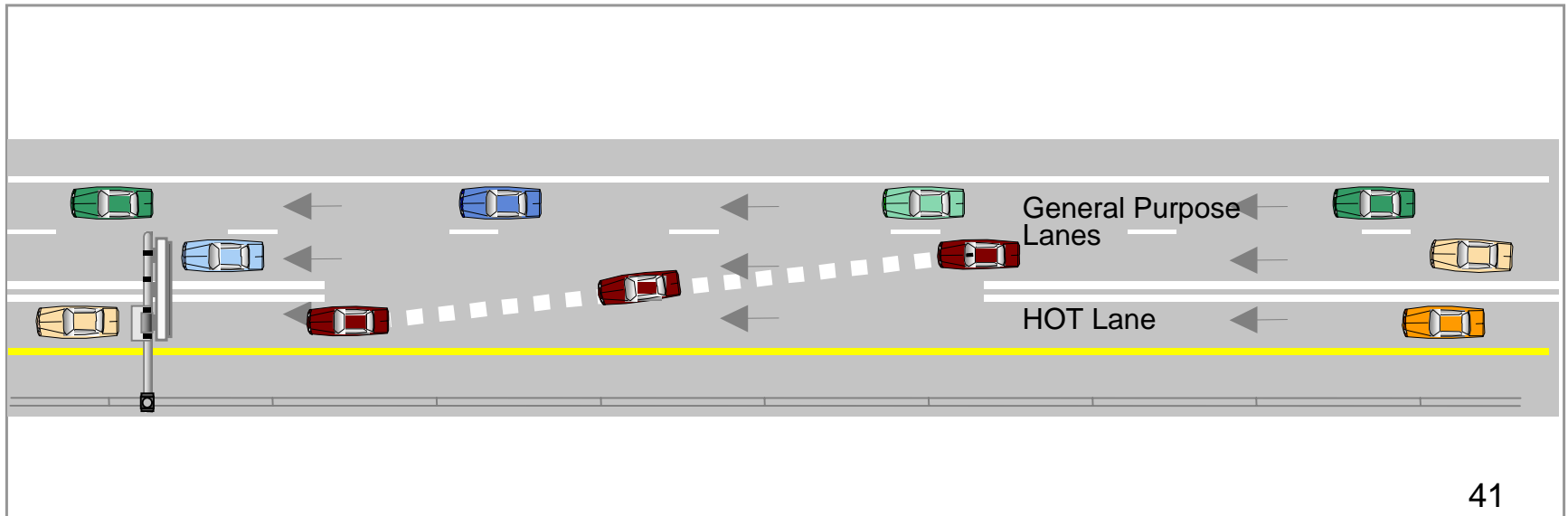
# HOV Lanes Midday Volumes Low on I-5 & I-405



# New Efficiency Tools

## HOT Lanes

- Separated Lane(s) dedicated to specific user groups (Carpools 2+, 3+, ...Transit)
- “Extra” capacity is sold to other users including SOV, delivery trucks, etc.
- Fees are set to maintain near free-flow conditions for users
- Provides benefits to all roadway users particularly transit buses

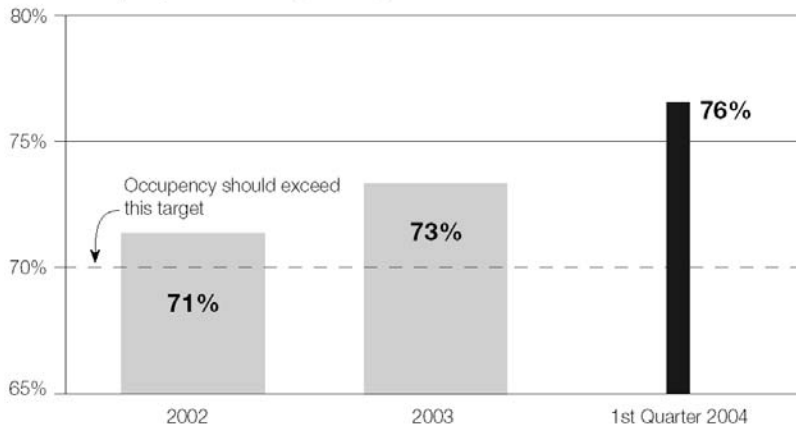


# Park and Ride Lots Bringing People Together

- 294 park and ride lots statewide with more than 35,000 parking stalls.
- Park and ride lots are integral to multimodal system. The lots create an artificial density that supports transit, vanpool and carpool uses.
- The lots make transit more efficient by reducing the number of transit stops

## Puget Sound Region Park & Ride Lots

Percent of Capacity Used: CY 2002, CY 2003, 1st Quarter 2004\*



\* Data availability has a lag of three months to allow the transit systems to collect and analyze the data.

Source: WSDOT, Public Transportation and Commute Options Office

## State Park and Ride Map



Five things successful Park and Rides have in common:

1. Location provides frequent direct peak service to major employment areas
2. Location provides users convenient and easy access in the approach to their destination
3. Transit vehicles have quick entry onto limited access roadway for direct connection to destination
4. Lot is served all day with at least 30 minute service
5. Users feel safe; confident that they will find available parking.

# Vanpools

- Washington State has the largest public vanpool program in the country.
- There are approximately 1,310 vans and 62 VanShare groups operating in the Puget Sound region today. Statewide over 1,600 vehicles are in operation every work day.
- Additional vanpool vehicles are provided and used by nonprofit groups, employers and private individuals.

## Statewide Vanpool Ridership

Annual totals 1988 to 2002

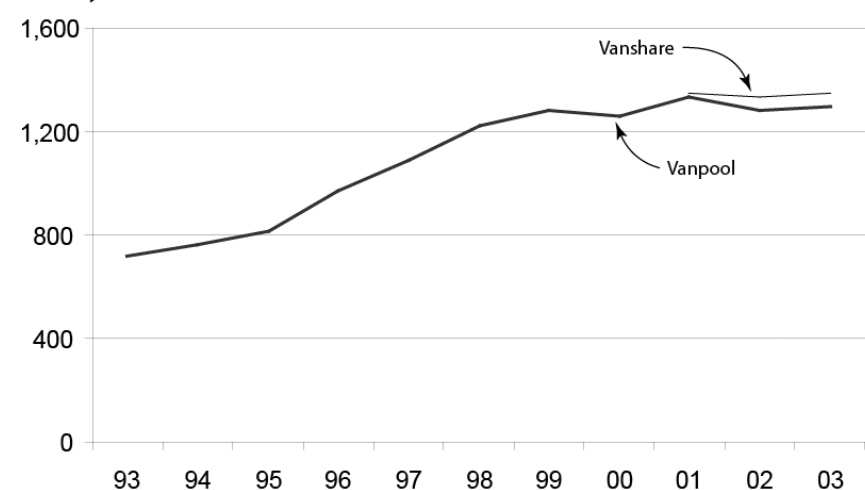
Millions of unlinked passenger trips



Source: WSDOT Annual Statistical Summary of Public Transportation (1992, 1993, 1994, 1995, 1996, 1997, 1998, & 2000)

## Operating Vanpools in Puget Sound Region

End of year 1993 to 2003



Vanpool vehicles operated by King County Metro, Pierce Transit, Kitsap Transit, Intercity Transit, Community Transit, and Island Transit

# Conserving Travel Through Transportation Demand Management (TDM)

## How can TDM make highway operations more efficient?

- Reducing the need for trips
  - By telecommuting, or serving people's needs via phone or internet
  - Getting more people into fewer vehicles (carpools, vanpools, transit, bicycles and walking)
- Changing travel time or route
  - To less congested times or different routes/destinations
- Mitigating construction delay
- Focusing trip reduction efforts on corridors and choke points

*There's plenty of room for improvement: Statewide, 74% of commute trips are made by driving alone.*

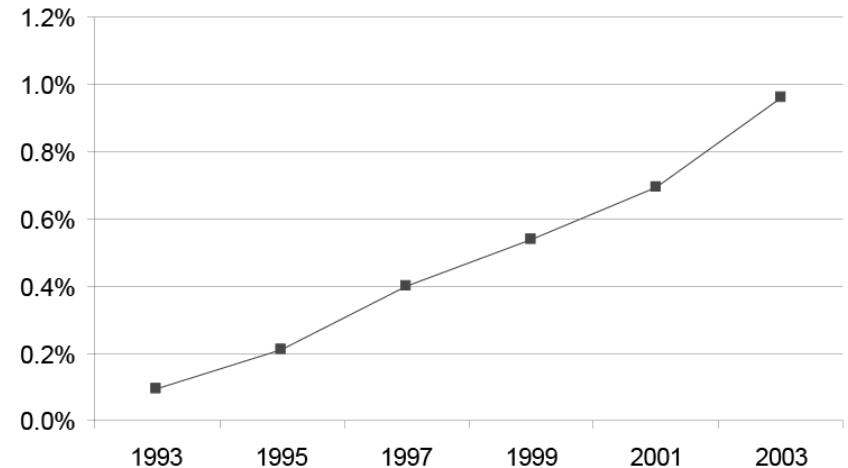
*Among all the travel modes tracked by the Census, working at home has increased the most in Washington. 40% more people statewide worked at home in 2000 than in 1990. (1990 – 86,000 and in 2000 – 121,000)*

*29.9% of all daily travel takes place in peak periods.*

# Travel Conservation: TDM Strategies

- Sharing vehicles
  - Vanpooling
  - Carpooling
  - Flexcar
- Workplace provisions
  - Transportation Management Associations (TMAs)
  - Telecommuting, alternative schedules
  - Guaranteed Ride Home programs
  - Showers, lockers, and bike parking
- Incentives and disincentives
  - Fare subsidies for transit and vanpools
  - Parking cash-out
  - Priority parking for carpools and vanpools
  - Parking charges
- Education and marketing

Teleworking as a percent of total work days at CTR sites  
1993 to 2003



Source: WSDOT CTR Database

# Using Land Policies to Conserve Travel

- Encourage compact, mixed-use development

Research shows significant shifts from SOV to transit and walking trips (up to 10 percent each) have been found to occur at moderately dense employment centers—20 and 75 employees per gross acre. Existence of retail in office buildings has been associated with vehicle trip rates that are 6% lower. *Frank & Pivo (1994) and Land Use and Site Design: Traveler Response to Transportation System Changes (TCRP, 2003)*.

- Increase costs of parking, while decreasing its availability

The share of non-SOV modes increases as parking supply decreases and cost of parking increases.

- Improve pedestrian access to transit and activities

- Improve the appearance and safety of the pedestrian environment

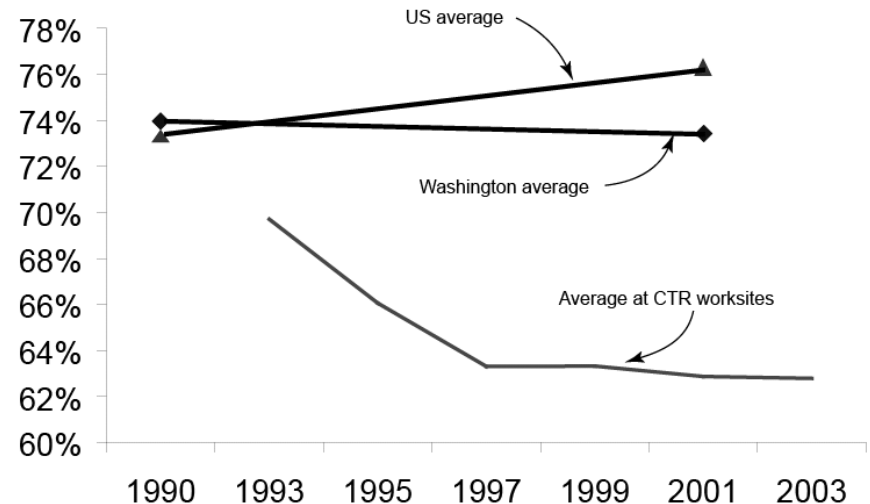
A number of studies have found that transit ridership and walking increase as the quality of the pedestrian environment improves.

# How Effectively are We Conserving Travel?

- The effectiveness of travel conservation varies by situation. Employees at some major worksites have reduced their drive alone rate by over 50 percent. The 1,087 work sites in the CTR program have reduced their drive-alone rate by over 9 percent.
- Different strategies work better in different contexts, but generally a combination of land use strategies, transit / rideshare services, incentives/disincentives, and parking strategies will work the best.
- Some TDM strategies are synergistic, while others can conflict if implemented together

**Percent of employees that drive alone to work**

1990 to 2003



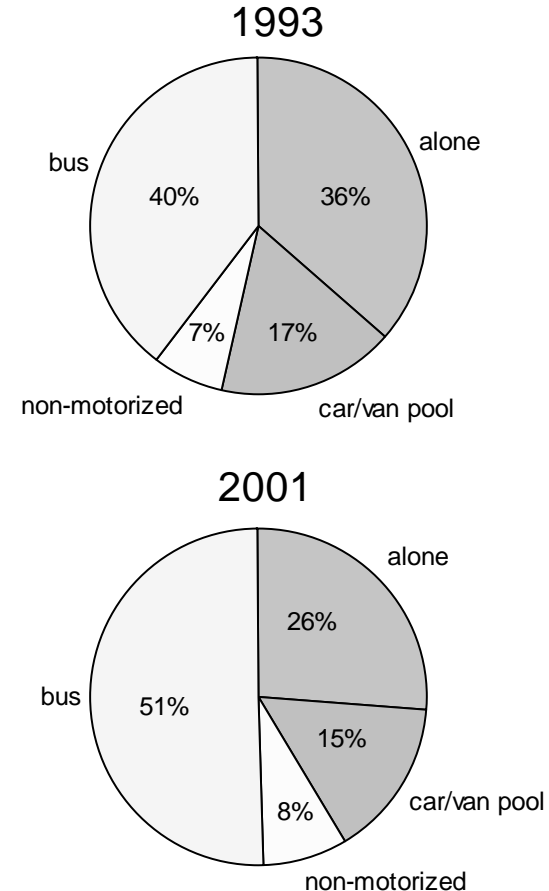
Source: US Census and WSDOT CTR Employee Database

*This graph compares reduction in the drive-alone commuting rate at the worksites that originally began CTR in 1993 with commuting data from the census.*

# Washington State's CTR program

- Employers of 100 or more people must develop trip reduction programs
- Local trip reduction ordinances
- WSDOT programs
  - Construction mitigation, pedestrian improvements, transit improvements
- Transit agency programs
  - Information & marketing, fare incentives
- Employers and organizations
  - Transportation management associations
  - Washington State Ridesharing Organization
  - Commuter Challenge
- B&O tax credits for CTR/TDM programs

## Change in commute mode to downtown Seattle



Source: WSDOT CTR Database

# Investing in Efficiencies

**Conserving travel with high occupancy vehicles and facilities contributes to an efficient transportation system.**

- A 40-foot bus carries 20-40 times as many people per vehicle as an auto
- Increased throughput with limited vehicle capacity requires investments in transit and high occupancy investments.

**Improving efficiencies requires tradeoffs between transit investments.**

- Addressing congestion may require a decrease in mobility investments (service levels, geographic span of service).

**Providing a fast reliable travel time is key to maintaining and attracting transit riders.**

- HOV lanes on freeways, with direct access ramps
- Arterial HOV lanes in congested locations
- HOV bypasses and queue jumps
- Transit Signal Prioritization

# **What's Happening on Washington State Ferries?**

# Boat Wait Time: A Measure of Congestion

Vehicle Delay – Weekday PM Peak, 3-7 pm  
May 2000-2003

## Average Wait Times (in minutes)

	2000	2001	2002	2003	% Change 2000-2003
Seattle - Bremerton	45	37	42	36	-20%
Seattle - Bainbridge	52	33	40	38	-27%
Fauntleroy - Vashon	26	31	24	25	-4%
Fauntleroy - Southworth	39	38	31	35	-10%
Vashon - Southworth	22	27	26	24	9%
Point Defiance - Tahlequah	21	23	33	34	62%
Edmonds - Kingston	26	27	25	22	-15%
Mukilteo - Clinton	35	25	29	27	-23%
Port Townsend - Keystone	32	28	22	30	-6%

# Wait Time Performance Policy

WSF has instituted zero boat wait for:

- Buses
- Walk-on passengers
- Pre-registered carpools and vanpools
- Vehicles with reservations traveling to Anacortes-Sidney B.C.
- Commercial vehicles that frequently travel to the San Juan Islands

# On-Time Performance – Trip Delivery

## 3rd Quarter FY 2003

## 3rd Quarter FY 2004

<i>Route</i>	<i># of Trips</i>	<i>% within 10 mins.</i>	<i>All Trips Avg Delay</i>	<i># of Trips</i>	<i>% within 10 mins</i>	<i>All Trips Avg Delay</i>
San Juan Domestic	5,057	90%	2.5 mins	5,886	88%	3.2 mins
International Route	59	93%	1.9 mins	19	95%	2.3 mins
Edmonds - Kingston	4,384	97%	2.5 mins	4,518	98%	2.5 mins
Passenger Only						
Seattle - Bremerton	1,634	97%	2.5 mins	N/A	N/A	N/A
Passenger Only						
Seattle - Vashon	982	98%	1.9 mins	922	99%	1.6 mins
Fauntleroy -						
Vashon-Southworth	10,107	94%	3.2 mins	9,688	95%	2.4 mins
Keystone - Port Townsend	1,701	96%	2.4 mins	1,747	92%	3.1 mins
Mukilteo - Clinton	5,450	99%	1.2 mins	6,372	99%	1.7 mins
Pt. Defiance - Tahlequah	2,702	95%	3.2 mins	3,038	98%	2.4 mins
Seattle - Bainbridge Island	3,806	97%	2.7 mins	3,911	98%	2.4 mins
Seattle - Bremerton	2,449	98%	2.2 mins	2,511	98%	2.5 mins
<b>Total</b>	<b>38,421</b>	<b>95%</b>	<b>2.6 mins</b>	<b>38,612</b>	<b>96%</b>	<b>2.4 mins</b>

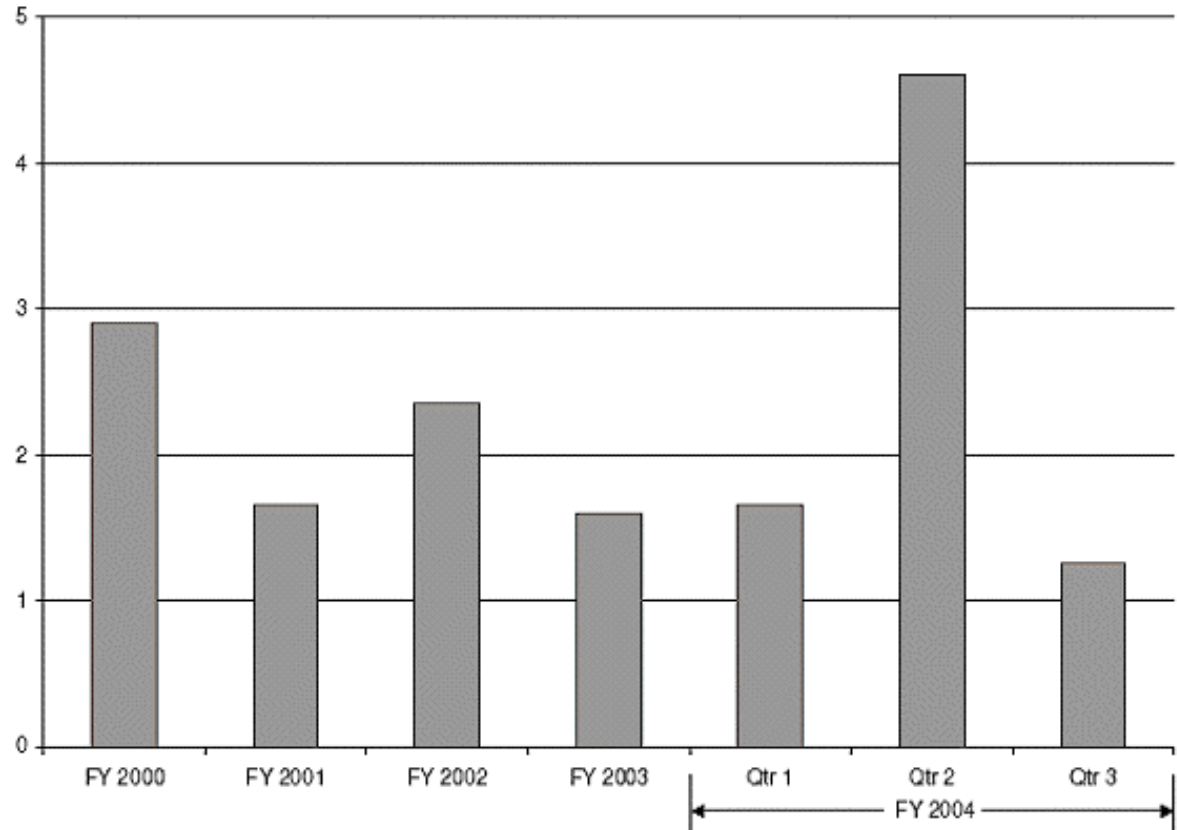
# Trip Reliability

During the third quarter of FY 2004, 39,916 trips were scheduled. Of these, 120 were missed.

This chart shows a system-wide average reliability index. The trip reliability performance for this quarter is the best on record.

The basis of the rating assumes that for a commuter working 200 days per year and making 400 trips on WSF, the statistical likelihood is that 1.2 ferry trips would be cancelled.

**Trip Reliability Index – Missed Trips per 400 Sailings**



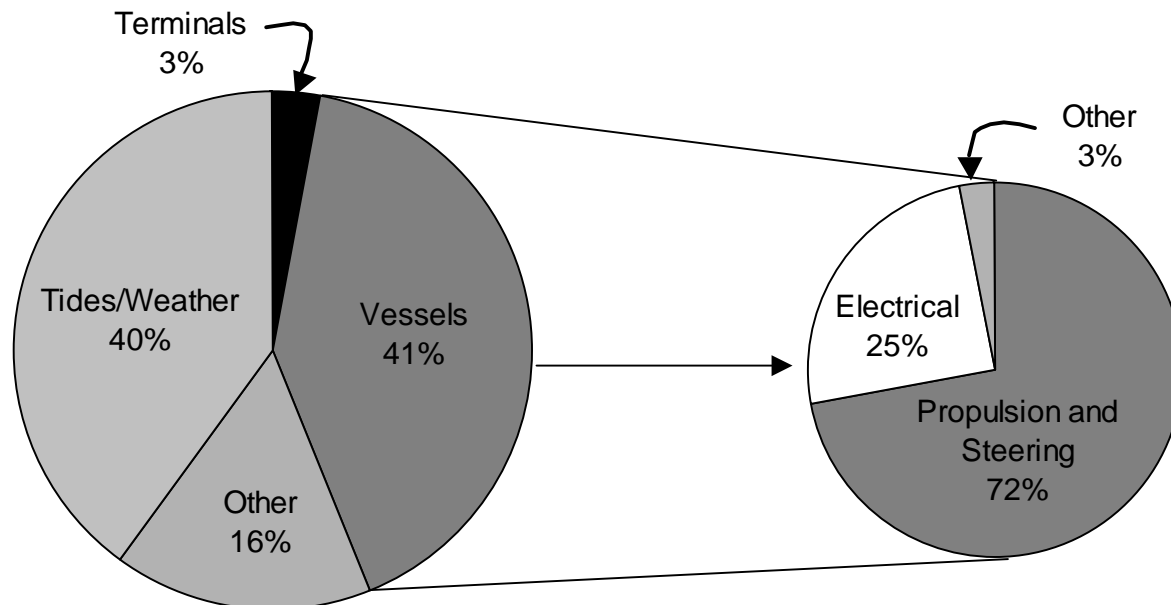
$$\text{Trip reliability index number} = \frac{\text{Cancelled Trips}}{\text{Total Scheduled Trips}} \times 400 \quad (\text{Average Annual Number of Commute Trips})$$

# Trip Reliability

Of the 120 missed trips in third quarter FY 2004, weather and tide related cancellations on the Port Townsend-Keystone route accounted for 58 missed trips.

On February 2, 2004, the MV Quinault experienced mechanical problems that resulted in a total of 15 missed trips. There was no service to the south end of Vashon Island from 2 PM until the end of the day. The crew performed the repairs and the Quinault returned to service the next day.

**Most Common Trip Cancellation Causes  
Third Quarter Fiscal Year 2004**



# Issues in Ferry System Efficiency

**Congestion:** Ferry traffic volumes fluctuate, so the system is designed to accommodate peak periods with some level of congestion and delay.

**Increasing Capacity:** Because service is usually added or subtracted in large increments (due to the size of the vessels), the next steps in increasing capacity initially makes the system less efficient.

**Peak and Off-Peak Travel:** Service is less frequent during times of lower traffic volume, such as late at night, in order to provide service more efficiently. The customer views service as not only the ability to move traffic but also the level of frequency.

**Intermodal Connectors:** There is dedicated transit service tied to ferry schedules, for example, Island County, the north end of Vashon Island and Kitsap County terminals. There is also very frequent service that is not linked directly with ferry schedules, for example, downtown Seattle Metro buses.

# **As we move ahead, the WTP will need to address the following issues related to system efficiency:**

- How to more fully tap the potential of operational strategies to improve system efficiency, and integrate operational strategies with expansion plans
- How to utilize the ability of pricing strategies to maximize system use
- What is the state role in transit operational programs, specifically:
  - Providing support for the development of park and ride lots
  - Coordinating and supporting transit connections across jurisdictional boundaries within regions
  - Providing additional transit service to address congestion in corridors
  - Including TDM strategies in highway project planning and construction